

The background of the cover is a photograph of a coastal radar station. A large, white, dome-shaped radar structure sits atop a grassy cliff. Other smaller radar domes and antennas are visible nearby. The cliff drops down to a rocky shore where waves are breaking. The sky is blue with some white clouds.

Currents

THE NAVY'S ENERGY & ENVIRONMENTAL MAGAZINE

spring 2014

Studying the Impact of **Seafloor Cables** on the **MARINE ENVIRONMENT**

NESDI Project Provides
Scientific Methodology & Data
to Aid in Sound Decisionmaking

Naval Base San Diego, Marine Corps Base Camp Pendleton
Host Inaugural SECNAV Energy Training Events

Sonobuoys Play Valuable Role in Marine Mammal Research
& Monitoring

Naval Air Station Jacksonville Heading for Zero Waste Discharge

INSIDE:
2014 Navy
Earth Day
Poster



THE NAVY'S ENERGY & ENVIRONMENTAL MAGAZINE **Currents**

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Principal investigators sponsored by the Navy Environmental Sustainability Development to Integration program recently completed the second year of a multiyear study assessing the placement and removal of an underwater cable from the Monterey Bay National Marine Sanctuary off the coast of central California. These efforts will aid the Navy in making sound decisions regarding the long-term disposition of seafloor cables.

Jack Sutton, Wild Bay Area Photography

Studying the Impact of Seafloor Cables on the Marine Environment

Project Provides Scientific Methodology & Data to Aid in Sound Decisionmaking

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World Class People Doing World Class Work

WELCOME TO THE spring 2014 issue of *Currents*. As the new deputy director of OPNAV N45, I am excited to have the opportunity Rear Admiral Slates offered me to use this space to communicate with you my initial thoughts about the Navy's environmental and energy programs.

I arrived in this position in December of 2013 with 23 years of environmental experience in the public and private sector. As the newest member of the Navy's environmental and energy leadership, I'd like to share with you some of the important programs and processes we are advancing.

Readers of this column know that the Navy sponsors mature and effective environmental programs that support the Fleets' operational training and testing needs afloat and ashore while protecting the environment. We also sponsor operational and shore energy initiatives to enhance Navy capabilities while increasing energy security and reducing cost.

Environmental planning and permitting for our at-sea training and testing remains a top priority. We have to do this right—it's about saving lives by training our Sailors and testing the equipment we give them, protecting marine resources, and retaining our training and testing capabilities for the future. We've had good success with our deliberate, phased permitting approach to ensure continuity in our

before refueling, or several more planes that can join the fight instead of serving as tankers, or more energy available for onboard systems. So we listen to the Fleet operators for demand signals, and also bring to their attention promising maritime and aviation technologies. We work to integrate our research investments with future full-scale production plans. As with any high tech company in the private sector, it is difficult to predict which technologies will take off. The stakes are high and the resources are limited. So we do what the best firms do—keep the customer (the Fleet) in mind.

I have always viewed this office, and the professionals with whom N45 interacts at the Pentagon and across the Navy, as world class people doing world class work. That was my impression before coming here, and now I actually know that's the case. We're working on high-stakes, high-visibility issues that are of keen interest to regulators, the public, Congress, the Fleets, systems commands, Secretariat, and others. When we "get it right," the result is that we are able to fulfil our national security obligation today and strengthen the Navy of tomorrow, while being good stewards of our environment.



We do what the best firms do—keep the customer (the Fleet) in mind.

ability to train and test at sea. I also like how our adaptive management process provides flexibility and transparency in compliance, as well as opportunity to work with regulatory partners to improve practices. Going forward, we have additional work to do with the regulatory community to streamline the permitting process by leveraging our comprehensive studies and analyses, track record and lessons learned.

I may be the new guy on the block in the energy arena, but anyone who is familiar with history knows that access to energy has been critical to our mission over the past two and a half centuries. At N45 we invest in operational energy research, development, testing and evaluation that enhance capability and reduce cost. Saving energy saves money, and for the operators can mean several extra days of steaming

Both in my previous Navy job and earlier in my career, I was aware of *Currents*. I have always been impressed with the look of the publication and the technical rigor of the articles, but I wasn't aware of its circulation to such an influential audience. I think the magazine punches way above its weight class in terms of effectively covering the Navy's energy and environmental issues—but again I'm finding that to be the norm for many initiatives handled by this office. It is both an honor and a privilege to be a part of the magazine and N45, and to have the opportunity to share my thoughts with you in my new role. 📌

Karnig H. Ohannessian
Deputy Director, Chief of Naval Operation Energy and
Environmental Readiness Division

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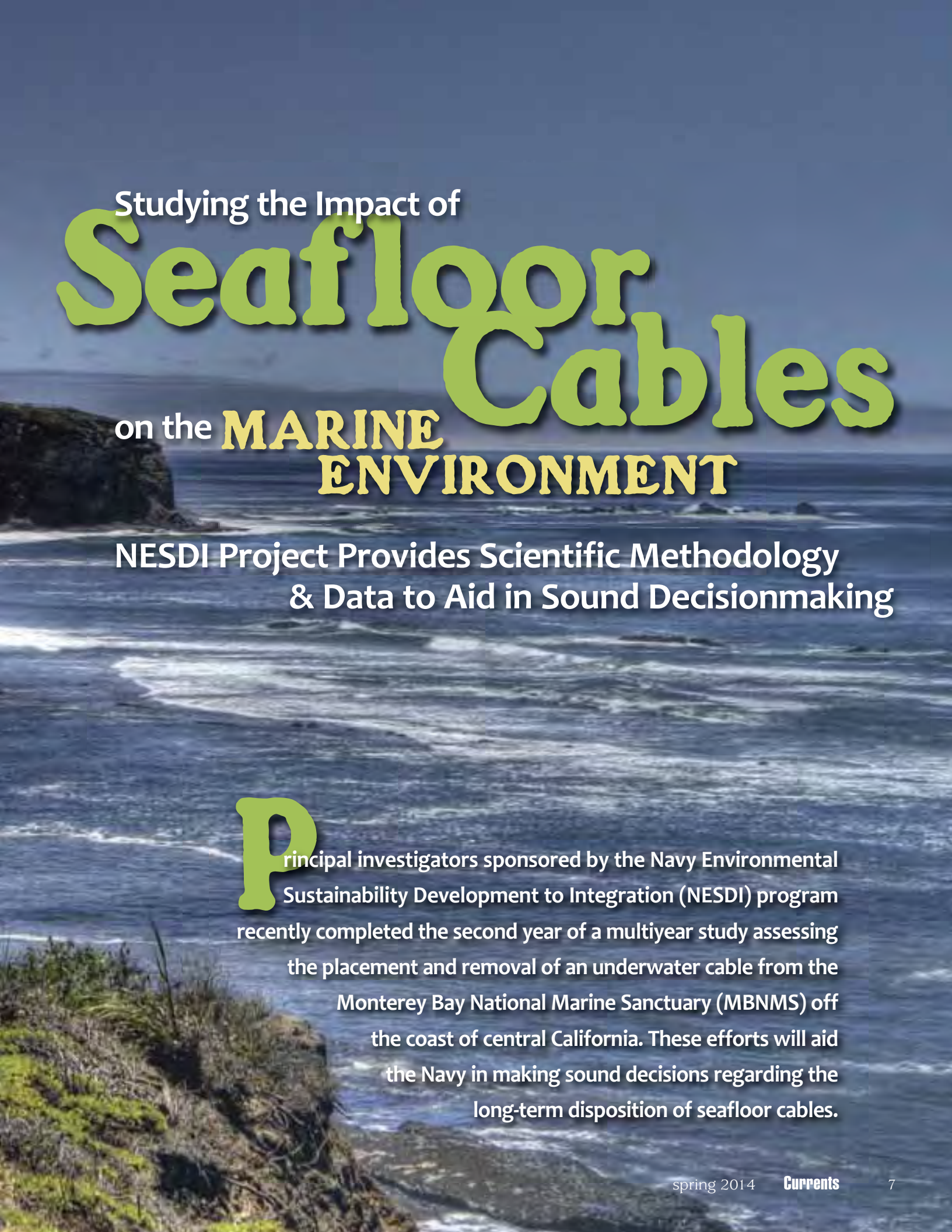
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Jack Sutton, Wild Bay Area Photography



Studying the Impact of

Seafloor Cables

on the **MARINE ENVIRONMENT**

NESDI Project Provides Scientific Methodology
& Data to Aid in Sound Decisionmaking

P rincipal investigators sponsored by the Navy Environmental Sustainability Development to Integration (NESDI) program recently completed the second year of a multiyear study assessing the placement and removal of an underwater cable from the Monterey Bay National Marine Sanctuary (MBNMS) off the coast of central California. These efforts will aid the Navy in making sound decisions regarding the long-term disposition of seafloor cables.



TOP LEFT: One aquarium contained a length of shredded cable in order to represent a "worst-case" scenario where all internal components of the cable were freely exposed to seawater.

TOP RIGHT: Cable components.

LEFT: Cross-section of weathered cable showing copper tube core and armoring steel wires.

Leslie Karr

UNDERWATER CABLES & THE NAVY

In 1858, the U.S. Navy participated in the installation of the first successful transatlantic cable. The USS Niagara and the British naval vessel HMS Agamemnon installed the pioneering telecommunications cable, which stretched from Ireland to Newfoundland and set the stage for instant worldwide communication.

Today, the Navy is responsible for a vast number of installed seafloor cables—estimates exceed 40,000 miles—that provide numerous functions such as communications, at-sea training, and surveillance. These cables periodically need to be repaired, replaced, and upgraded, and

new cables must sometimes be installed to meet the changing requirements of the Navy.

The Navy, along with other federal agencies, has regulatory compliance requirements when installing seafloor cables. In response to the increased installation of commercial communications cables in recent years, regulatory agencies and marine sanctuaries have increased their awareness of and permitting requirements for the installation and removal of undersea cables. In some cases, these requirements have effectively blocked planned cable installation routes, and required longer and/or additional routes, which can raise project costs significantly.

Current Navy practice is to leave out-of-service cables in place. While removing undersea cables has the potential to cause environmental, financial, and operational impact, until recently there has been a lack of scientific evidence regarding the impact of undersea cables on the environment. The goal of a NESDI-sponsored study near Half Moon Bay is to add to this body of knowledge by documenting the expected or observed impact of an undersea cable before and after its removal.

SCIENTIFICALLY DEFENSIBLE INFORMATION

The project consisted of two phases—laboratory studies to determine whether cables leach contaminants, and a field study to examine potential environmental impacts from the original placement and removal of one specific cable.

Laboratory results indicated that no metals, other than zinc, were significantly elevated in the test aquariums relative to controls.

PHASE I: THE LABORATORY STUDY

One long-time impetus for the removal of out-of-service cables has been the concern that these cables may leach contaminants of concern into ocean waters. To address this concern, the NESDI program initiated the first phase of its efforts—a laboratory study led by John Kornuc from the Naval Facilities Engineering and Expeditionary Warfare Center (EXWC).

Scientists set up 16 saltwater aquariums to test potential chemical leaching from cables when exposed to seawater under various conditions. Segments of a copper-conductor armored communication cable were used. Researchers added samples of this type of cable, at various ages and conditions, to each tank. Both new cables and cables retrieved from the seafloor after years of use were tested. Tanks contained a bottom substrate, aragonite sand, and some tanks also contained “live rock,” which is ancient coral skeletons colonized by bacteria. Certain tanks also housed test organisms—snails, crabs and other invertebrates—animals considered very sensitive to chemical leaching, particularly copper. Researchers buried some cables in the substrate, while other cables were laid on top of the substrate. One aquarium also contained a length of shredded cable in order to represent a “worst-case” scenario where all internal components of the cable were freely exposed to seawater.

The aquarium water, substrate, and organisms were periodically sampled and analyzed for the presence of metals and organic compounds which would be characteristic of leaching of the cables. Researchers compared these results to baseline values (analytical results prior to the introduction of the cables) and “control” aquariums which did not contain cables. Water samples were taken at three, six and 12 months.

Typical cables contain a copper conductor or optical fibers, steel,

polyethylene, nylon, elastomers, and waterblock compounds. Cables which are subject to high-energy environments, such as cables that pass through the surf zone, are often armored with wound steel wire. Due to the corrosive nature of saltwater, this steel wire is typically galvanized—meaning it is coated with a layer of zinc.

Laboratory results indicated that no metals, other than zinc, were significantly elevated in the test aquariums relative to controls. In addition,

THE BASICS ABOUT THE NESDI PROGRAM

THE NESDI PROGRAM seeks to provide solutions by demonstrating, validating and integrating innovative technologies, processes, materials, and filling knowledge gaps to minimize operational environmental risks, constraints and costs while ensuring Fleet readiness. The program accomplishes this mission through the evaluation of cost-effective technologies, processes, materials and knowledge that enhance environmental readiness of naval shore activities and ensure they can be integrated into weapons system acquisition programs.

The NESDI program is the Navy’s environmental shoreside (6.4) Research, Development, Test and Evaluation program. The program is sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division and managed by the Naval Facilities Engineering Command out of EXWC in Port Hueneme, California. The program is the Navy’s complement to the Department of Defense’s Environmental Security Technology Certification Program which conducts demonstration and validation of technologies important to the tri-Services, U.S. Environmental Protection Agency and Department of Energy.

For more information, visit the NESDI program web site at www.nesdi.navy.mil or contact Leslie Karr, the NESDI Program Manager at 805-982-1618, DSN: 551-1618 or leslie.karr@navy.mil.



pollutant organic compounds were not detected. Zinc levels were highest in those tanks where new cables were in direct contact with circulating seawater and sat on top of the substrate. The tank containing the new shredded cable had the highest levels of dissolved zinc. Cables which were embedded in the substrate also had significantly elevated levels of zinc, but lagged behind the cables which sat on top of the substrate likely due to decreased diffusion rates. Older cables retrieved from the ocean had lower levels of dissolved zinc, likely due to the decreased zinc content of the armoring from years of previous saltwater exposure.

Interestingly, in those tanks where live rock was present, dissolved zinc levels were substantially lower, by up to about 500-fold. Investigators theorize that bacteria in the rock, and the rock itself (through ion exchange processes) adsorbed the zinc. This is a situation more analogous to what would occur in the ocean. Additionally, algae in these aquariums showed elevated levels of zinc (as opposed to the control tanks), while snails in the tanks showed no increase in zinc levels.

Kornuc emphasized that each aquarium tank test was a closed system and therefore not subject to rapid contaminant dilution effects that exist in the ocean environment. As identified in this study, zinc will most likely be one of the primary drivers in submarine cable risk-based decision-making, but numerous other factors including dilution, cable type,

cable condition, and benthic environment, will play major roles.

THE FIELD STUDY: BACKGROUND

The focus of Phase 2 of the project, the field study, was a 96-kilometer-long cable installed in October 1995 off California's central coast.

Although this cable was never directly used by the Navy, it was owned by the Office of Naval Research, and provided to the

ECHOING THE LAB STUDY RESULTS

A LABORATORY STUDY conducted concurrently in Great Britain returned results remarkably similar to the Phase 1 laboratory study. The purpose of this particular study, conducted by Southampton and Bangor Universities for the Isle of Man Department of Agricultural Fisheries and Forestry, was to determine whether abandoned cable was safe to use in the construction of artificial reefs. Tests on new cables indicated that there was some leaching of zinc in the initial stages of the trial, but that this dropped quickly after immersion. Researchers using old, reclaimed cable found that the risk for water pollution actually decreased with the age of the cable. For more insights into this study, visit www.gov.im/lib/docs/daff/Fisheries/cablereefconsultationjun2009.pdf



Diver on the surface above the cable location at Pillar Point.
Jessie Altstatt

Diver Mike Moss prepares to enter the water for the pre-removal survey in May 2011.

Jessie Altstatt



North Pacific Acoustic Laboratory for a project known as the Acoustic Thermometry of Ocean Climate (ATOC) project.

THE ATOC PROJECT

The ATOC project, conducted by a consortium of four academic institutions, set up underwater recording devices in order to monitor ocean temperature fluctuations. The ultimate goal of the project was to test and refine climate models to gain a better understanding of the link between climate change and sea level rise.

The project partners received a permit from the National Marine Sanctuary Program (NMSP) of the National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service to conduct their work. This was necessary because regulations implementing the designation of MBNMS prohibit the disturbance of the seabed without a permit. The permit specified that the permittee (Scripps Oceanographic Institute) must remove the cable prior to 30 September 1997, the original expiration date of the permit. The permit was amended eight times, primarily for the purpose of extending the expiration date, until finally the expiration date was set as December 31, 2001.

On June 22, 2001, NOAA's Office of Oceanic and Atmospheric Research (OAR) filed an application with NMSP, requesting permission to use the cable for 25-30 years to support a passive acoustic monitoring project. In evaluating this request, NMSP learned that no data existed on the condition of the cable and concluded that it could not determine if the impacts of the cable's presence were truly short-term and negligible as is required by MBNMS regulations.

The NMSP determined that the impacts of leaving the cable in place for two additional years were considered short-term and negligible. However, the permit was issued on the condition that OAR agree to survey the cable and obtain data about the effect it was having on MBNMS resources and the environment. OAR partnered with the Monterey Bay Aquarium Research Institute (MBARI) to conduct this survey.



The cable location prior to cable removal showing sponges, hydroids and tunicates.

Jessie Altstatt



Rock Crab (*Cancer productus*) photographed during the two-year post-removal survey.

Jessie Altstatt

Nine stations, or segments of cable were chosen for quantitative comparison with “control” sites—similar areas five to ten meters away where the cable was absent. Survey locations were chosen in both nearshore and deep water locations to target substrate and habitat types, features of interest, and for logistical reasons. Divers collected a total of 42 hours of video footage and 138 sediment samples over 15.1 kilometers of seafloor. Approximately 13 percent of the cable was observed in this manner.

Video observations indicated that most of the nearshore cable had become buried over time in sediment substrates, whereas much of the cable remained exposed on the seafloor at deeper depths. Researchers observed quite a bit of abrasion and fraying in the shallower depths due to high wave energies. Some sharp kinks were observed at deeper depths in areas subject to heavy trawling. No entanglements with fishing gear or marine life were observed.

THE BASICS ABOUT THE MONTEREY BAY NATIONAL MARINE SANCTUARY

LOCATED ALONG THE central California coast between San Francisco and Cambria, the MBNMS is a federally protected marine area. It encompasses 4,600 nautical miles and extends an average of 30 miles from shore. The sanctuary contains the largest kelp forests in the nation, and one of North America’s largest underwater canyons—reaching a depth of over two miles. The area harbors a wide variety of marine life, including 34 species of marine mammals, more than 180 species of birds, at least 525 species of fishes, and an abundance of invertebrates and algae.

Recreational activities and commercial fishing are allowed within the MBNMS, but activities such as oil drilling and seabed mining are not. For more about the sanctuary, visit <http://montereybay.noaa.gov/intro/welcome.html>.



One particular species of anemone was especially numerous, essentially utilizing the cable as a colonization surface similar to outcrops and isolated rocks.

MBARI researchers found abundant sea life attached to the cable at its deepest depths, including anemones, echinoderms (including sea stars and sea urchins) and sponges. One particular species of anemone (*Metridium farcimen*) was especially numerous, essentially utilizing the cable as a colonization surface similar to outcrops and isolated rocks.

The researchers determined that, if left alone, the cable would likely continue to cause abrasion of nearshore rock outcrops, and could snag fishing gear. However, removing the cable would not only cause organism mortality and disturbance, it would also remove an obstacle to trawling, possibly resulting in increased fishing in the area. It was postulated that the removal process would also likely cause rock breakage and beach impacts, effectively destabilizing the area.

However, the environmental assessment prepared as a result of the study also determined that the effects of removal were “expected to be minor and short term” with “few (if any) uncertainties.” However, “little is known about the long-term impacts of leaving the cable abandoned in the Monterey Bay National Marine Sanctuary.” For these reasons, the decision was made to remove the cable.

More about this effort can be found at www.mbari.org/news/publications/ATOC.pdf

3. There may be conflicts with the installation and operation of new submarine cables in the vicinity of an out-of-service cable.

4. There could be chemical leaching from cable constituents into the surrounding media.

To address concerns regarding the impacts of cable motion on hard-bottom substrates and associated biological communities, regulators now require installers to avoid high-relief outcrops and sensitive species (deep-water corals) whenever possible. If interaction with these sensitive species is unavoidable, monetary compensation may be required.

CONTINUED ON PAGE 16.

MEANWHILE IN SOUTHERN CALIFORNIA

In 2010, EXWC initiated a NESDI-funded project to determine the effects of cable installation, presence and removal. This comprehensive project, “Environmental Analysis of Seafloor Cables,” provided background information on the composition, installation, maintenance, and repair of seafloor cables, and reviewed case studies to determine the environmental fate, effects, and final disposition of seafloor cables.

A literature review identified the main areas of concern among regulators in regard to seafloor cables:

1. Cable motion on the seafloor could produce long-term adverse modification of hard-bottom substrates and associated biological communities.
2. Unburied cables could pose potential entanglement issues with fishing gear and marine mammals.

Frilled dogwhelks (*Nucella lamellosa*) and a Leather Star (*Dermasterias imbricata*) found during the one-year post-removal survey.

Jessie Altstatt





Typical sea life in the area included sea stars and sponges. This photo was taken before cable removal.



Sea star attached to the cable just prior to removal.



The initial pre-survey performed by divers in May, 2011 was in near zero visibility.



Frilled Dogwelk (*Nucella lamellosa*) aggregation with eggs photographed during the two-year post-removal survey.



Nudibranch (snail without a shell) among tunicates and the miscellaneous invertebrate and plant matrix that colonized the rock outcropping above the cable location.





Stubby Rose Anemone (*Urticina coriacea*) found during the one-year post-removal survey.



Juvenile sea star (*Pisaster spp.*) feeding on barnacles attached to the in-shore cable before it was removed in July 2011.



High relief rock substrate with orange sponge, red foliose algae and other invertebrates. This photo was taken one year post-removal.



While the cable itself rested on flat substrate, the rock outcropping above the cable's former location hosted such sea life as this white sponge, shown surrounded by tunicates and red algae.



A white sponge, algae, and miscellaneous invertebrate and plant life that colonized the area above the former cable location. This photo was taken one month after the cable's removal.

Nudibranch on a rock outcropping adjacent to the cable location. This photo was taken just prior to cable removal in July 2011.





The cable's former location as seen in September, 2013. Fragile, low-lying siltstone shows signs of side-to-side abrasion.

Jessie Altstatt

CONTINUED FROM PAGE 13.

With regard to possible entanglement issues, a 2008 study found that modern cable installation techniques have virtually eliminated the entanglement risk to marine mammals. (Wood, Matthew Peter and Lionel Carter. 2008. "Whale Entanglements with Submarine Telecommunication Cables," Institute of Electrical and Electronics Engineers Journal of Oceanic Engineering, vol. 33, no. 4, 445-450.) There have been no whale entanglements since 1959.

Undersea cable does sometimes pose an impediment to fishing practices, particularly trawling. In some cases commercial or recreational fishermen have also lost gear due to entanglement issues. The resolution of these issues has typically been negotiated through agreements between cable stakeholders and the affected fisheries.

Potential conflicts with the installation and operation of new submarine cables in the vicinity of an out-of-service cable is still and will continue to be an issue.



One year after the cable's removal, the former site shows signs of abrasion and regrowth.

Jessie Altstatt

The possible chemical leaching from cable constituents into the surrounding media was addressed in the NESDI project described above.

Like the MBARI study before it, "Environmental Analysis of Seafloor Cables" concluded that "The evidence is clear that submarine cables provide a substrate for the attachment of marine biota." It also pointed out that cable removal can have a variety of negative environmental impacts. The study reported that cables can often be repurposed without removal, saving significant amounts of money and impact to the environment. However, the team stressed the need for continued laboratory and field research, including efforts like the NESDI-sponsored ATOC cable study in MBNMS discussed below. This report will be available in mid-2014 for download from the NESDI web site at www.nesdi.navy.mil (username and password required) or by contacting John Kornuc.

DEEP WATER REMOVAL

The ATOC cable removal operation was performed in accordance with a Memorandum of Understanding (MOU) established on June 25, 2010 between NOAA and Naval Facilities Engineering Command Engineering Service Center (now EXWC), and under the guidelines of NOAA permit MBNMS-2001- 031.

The removal process occurred in two phases. The offshore portion of the cable was removed first, in November 2010, utilizing the International Telecom (IT)

Modern cable installation techniques have virtually eliminated the entanglement risk to marine mammals.

cable ship Intrepid. The IT Intrepid recovered the cable over the bow using a cable drum. Standard procedure is for the cable to be stored in large circular tanks below deck until the ship visits a port of convenience, where the segments can be offloaded and recycled by the contractor. The offshore cable, with the exception of three pre-existing breaks, was recovered in good condition. There was abundant sea life attached to the entire length of this cable, including a large species of anemone.

The objective of this operation was to remove as much of the cable as possible. However, about one kilo-

meter of nearshore cable remained in water too shallow for the Intrepid to navigate. This section of cable, scheduled for removal in June 2011, was the site of the NESDI-sponsored pre- and post-removal studies.

THE NEARSHORE FIELD STUDY

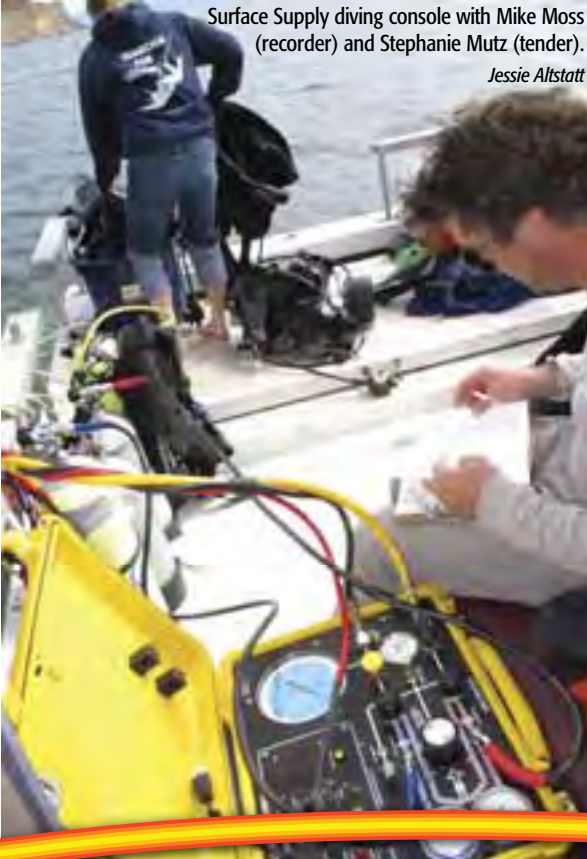
The second phase of the NESDI study evaluated the benthic (seafloor) environment in the nearshore portion of the cable before and after its scheduled removal. Scientific divers implemented various accepted marine ecology survey methods to examine the habitat and associated biological communities along the cable and adjacent areas. Methods included a comparative approach similar to those used by the MBARI team. The study consisted of a total of five dive survey events (of two to four days each) and are referred to below as the Pre-Survey, Pre/Post-Removal Surveys, One Year Post-Removal Survey, and Two Year Post-Removal Survey.

Pre-Survey

Scientific divers were mobilized on May 22, 2011 to locate the cable and perform an initial assessment of the benthic environment. The nearshore portion of the ATOC cable was in a high-energy location subject to high wave action and frequent storms. Consequently, the initial pre-survey performed by divers was in near zero visibility conditions and the four follow-on survey events had to be planned carefully to string together even a few days of acceptable dive conditions. The pre-survey concentrated on locating and mapping the cable location and evaluating locations for the establishment of memorialized survey locations. Once the cable was located and marked,

Surface Supply diving console with Mike Moss (recorder) and Stephanie Mutz (tender).

Jessie Altstatt



Research Vessel Susie II at anchor on a calm day. On deck are lead scientist Derek Lerma and scientific divers Mike Moss and Stephanie Mutz.

Jessie Altstatt





NAVFAC SW personnel aboard the NR-1 (22-foot Boston Whaler) outside of Ross's Cove above the ATOC location.
Jessie Altstatt

single beam sonar soundings were conducted from a Boston Whaler along diver-positioned buoys to map the cable path (GPS coordinates), depth, and surrounding substrate.

Divers documented the cable lying along the bottom on rock and sand or intermittently suspended between substrate. Some rock deformation and sand burial was observed in relation to the cable. Divers noted that the cable's position tended to settle among the low points of the rock, and the rock-sand interface appeared frequently disturbed from wave action and sand movement. Biological communities on or adjacent to the cable were relatively low in density and diversity relative to nearby high-relief substrate. The physical movement of the cable was documented to cause noticeable impacts to the substrate and associated biota at less than a one-meter scale. Based on pre-survey observations, researchers determined that the habitat along the nearshore portion of the cable experienced significant scouring from persistent wave action and suspended



Abundant sea life was attached to the deep water cable.
Jessie Altstatt

sand/debris from the shoreward beach, to a degree that no perennial macroalgae communities occur or become established.

Pre/Post-Removal Surveys

As this portion of the cable was removed in July 2011, pre/post cable removal surveys were conducted in the July and August 2011 timeframe. Survey methods included a band transect method and point contact method, conducted by the divers. Both methods involved studying a specific length of the cable and comparing it to a reference site (where cable was absent) two to five meters away on a parallel trajectory.

The point contact method involves laying down a weighted measuring tape across the cable and quantifying organisms and substrate type a set distance on either side of the cable. Divers made visual observations of the types of organisms found along these memorialized transects to document potential impacts and recolonizations after the cable was removed. This method provides a general measure of the density and diversity of various types of sessile (attached) marine life.

The band transect method is a broader mode of observation designed to quantify motile (mobile) invertebrates or species with clumped distributions. In this process, the area to be surveyed is divided into four meter by one meter

sections or transects. Selected key species or target species representative of the surrounding habitat are individually counted and recorded. For more details, see the sidebar entitled “Survey Methods.”

The findings from both of these surveys were subjected to statistical

analyses to discern differences in the cable versus reference transect, and between the cable area both pre- and post-removal. Species composition and diversity between cable and control sites were similar and observations of adjacent areas confirmed that the documented habitat extended at least 200 meters north and south of the survey sites.

Differences in species composition between the cable and adjacent habitat were not significant and showed that the cable served as similar habitat and supported like biological communities.

SURVEY METHODS

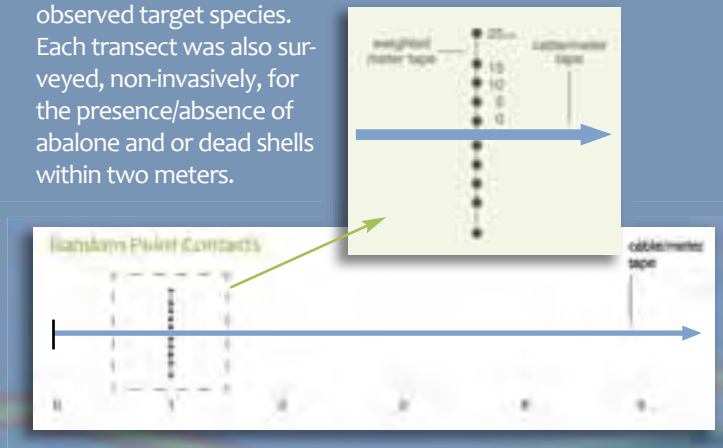
THE INITIAL STUDY design assumed a rocky reef macroalgae (kelp) environment supporting common central California coast marine invertebrates and fish. Because of the physically disturbed nature of the habitat and relatively low density of biological communities identified in the pre-survey, a modified fine scale comparative approach was adopted to document both the pre-removal and post-removal condition of the biological communities adjacent to the cable and at reference transects. This methodology was similar to that utilized in the MBARI study discussed above.

The band transect method utilizes 10 paired (1 x 4 meter) contiguous transects on opposite sides of the cable, totaling 80 square meters per transect study area. For each dive event of several days, the two cable and reference transects were enumerated for all occurrences of target macroalgae and macro invertebrate species.

The point contact methodology utilized a 50-centimeter (cm) piece of weighted marked lead line that is laid perpendicular to transects at each meter mark along a transect tape. Divers use this line as a guide to identify and record attached species, assemblages, and substrate immediately adjacent to the cable on either side at distances of 5, 10, 15, and 25 cm from the cable. Ten points are inspected at each meter mark, and each transect length was 40 meters, resulting in a total of 400 inspection points per transect. An additional three cable inspection points per meter were also added to capture species residing directly on the cable. The point contact methodology recorded the substrate at each point and incorporated a wide variety of sessile species (those that live exclu-

sively on substrate) and assemblages (species groups). Due to the large volume of data collected by the point contact method, sampling was performed using surface supply diving equipment fitted with underwater communications that expedited data collection and improved safety.

Photo imagery from scientific divers was used to document all transects as well as the cable's path from its offshore terminus end shoreward to the extent practicable. Divers photographed each transect and captured representative images of observed target species. Each transect was also surveyed, non-invasively, for the presence/absence of abalone and/or dead shells within two meters.



Data on macro invertebrate species diversity and density were similar for both treatment and reference transects. The primary motile macroinvertebrate species consisted of sea stars and a predatory dogwhelk (snail) capable of subsisting in a physically demanding environment. The low density and diversity of macro invertebrate species recorded during band transects was consistent with observations from general species list surveys.



North part of Ross's Cove as seen from the cliff just north of Pillar Point.

Jessie Altstatt

In most cases, the weight of the cable, in conjunction with the frequent changes to the bottom topography and self-burial within sand channels, greatly restricted the cable's movement and subsequent impacts to the surrounding biological communities. However, in some locations, damage to the cable and abrasion of rock due to cable strumming (vibration) had occurred.

Based on the observations of the cable's position along the seabed and an analysis of the data, differences between the cable and reference transect were a function of cable abrasion along rock surfaces. Divers found a significantly higher degree of plant life (filamentous diatoms) on the cable transects versus the reference transects. This is likely due to the fact that these life forms quickly colonize space made available from cable abrasion. The significant differences in percent cover of all sessile invertebrates calculated from the point contact method support the same conclusion.

The Removal Process

The nearshore cable removal planning and field operation was performed by EXWC's Ocean Facilities Department, the Navy's Underwater Construction Team 2 (UCT 2) with the added support of Pillar Point Harbor personnel and contractor work boat and hauling/disposal equipment and services. The cable was removed between July 18 and July 23, 2011. Work was performed in a manner calculated to have minimal impact on the seabed and beach. The first step was to cut the cable loose from its onshore anchor (four to six feet underground) and to dig out the rest of the underground section up to the waterline. The undersea portion of the cable was pulled aboard a fishing vessel utilizing a large winch device. The cable was cut into 22-foot sections, bundled, and delivered to Pillar Point Harbor for delivery to a salvage container.

One Year Post-Removal Survey

One year after the cable was removed, divers returned to survey the cable's former footprint and the previously established cable and reference transects. Their main goal was to monitor changes in the density and richness of the benthic environment. Percent cover of sessile species and assemblages remained low in density and species richness, similar to results from the 2011 surveys. Overall, changes in percent cover of species or assemblages were greatest for the miscellaneous plant, miscellaneous invertebrate, and bare substrate categories and were similar for both cable and reference transects. Similar to 2011, no canopy-forming macroalgae were found during the 2012 post removal surveys.

Changes in species or assemblage percent cover between pre- and post-removal surveys displayed mostly a redistribution of percent cover among lower level biological communities; miscellaneous plants, miscellaneous invertebrates and bare substrate categories or assemblages. Seasonal vari-

Differences in species composition between the cable and adjacent habitat were not significant.

ability of percent cover of these categories or assemblages within the project footprint are likely much greater than impacts associated with the cable's movement or removal. Changes in percent cover of sessile species occupying low relief or flat rock substrate documented from pre removal to one year post removal surveys were likely a result of covering by the dominant assemblages rather than disturbance from the cable or its removal. Similar trends in species composition and percent cover were observed for both cable and reference transects in most cases.

The two year post-removal survey, completed in September 2013, returned similar results. All three surveys are currently being incorporated into the project's final report.

CONCLUSIONS

Overall, the biological impacts of the presence or removal of the ATOC cable are minor, particularly in the context of high-energy environmental conditions within the nearshore region of this area. The likelihood of the presence of sensitive biological resources within the observed inshore portion of the ATOC cable both past and present are low based on collected data and biologist observations. Impacts from submarine cables on the subtidal marine environ-

ment are a function of the value and complexity of the surrounding biological assemblages.

The ATOC cable was placed within a high-energy environment that was detrimental to the cable's function and subsistence but also avoided valuable biological resources and communities. The consistency of the study results in terms of species diversity, density and distribution in the pre- and post-removal surveys provided evidence that the proper methodology is in place to document the differences in and/or recovery of these communities after cable removal. The methods utilized in this survey can potentially provide an effective blueprint for future efforts in this type of high-energy nearshore environment. ⚓

THE BASICS ON THE NAVAL SEAFLOOR CABLE PROTECTION OFFICE

THE NAVAL SEAFLOOR Cable Protection Office (NSCPO) is the primary initial point of contact within the Navy for cable concerns related to marine policy and encroachment, environmental planning, seafloor deconfliction, and technical issues. The NSCPO participates in national and international forums with the commercial undersea cable industry and other government agencies. In addition, NSCPO represents the interests of Navy cable owners in policy discussions with all levels of United States government.

The NSCPO was created in 2000 by the Naval Facilities Engineering Command to address the increasing number of cable breaks. During the late 1990's, the Navy was averaging 10 breaks per year.

Part of the office's success is due to the database that NSCPO developed to pinpoint the location of all Navy-controlled seafloor cable and to track inquiries. Through this database, the NSCPO is uniquely positioned to answer queries from commercial cable owners, planners, surveyors and installation contractors in order to minimize possible damage to Navy cable systems.

Note: Once the laboratory studies described in this article were completed, Bill Major, formerly with EXWC, was the driving force behind the execution, analysis and documentation of the cable removal efforts. Bill also made significant contributions to this article before his retirement at the end of 2013.

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DID YOU KNOW?

How did I save energy for the Navy?

Over the last three years my team and I have saved more than \$517,000 in energy, received \$800,000 in utility rebates, cut water usage by 2,988 kilo-gallons, and cut over 33,825 British Thermal Units (MMBTU). (MMBTU is an energy measurement for steam, electricity or natural gas.)

Name: Matthew Schreck

Age: 34

Hometown: San Diego, CA

Job: Energy and Water Conservation Manager

Command: Fleet Readiness Center Southwest (FRCSW)



Matthew Schreck was selected as the 2012 recipient of the Chief of Naval Operations (CNO) Environmental Award in the Individual Sustainability category. The annual CNO environmental awards program recognizes Navy ships, installations, and people for outstanding achievement in Navy environmental programs.



ENERGY SECURITY ENHANCES COMBAT CAPABILITY

Did you know that the Secretary of the Navy announced that by 2020, the Department of Navy will produce at least 50 percent of shore based energy from alternative sources?

As FRCSW's Energy Program Manager, I am responsible for overseeing numerous energy-saving and water conservation projects. Currently, my team and I are developing over 60 new and exciting energy-saving projects for the Command. From implementing energy efficient equipment, such as solar panels, to training our Building Energy Monitors, energy conservation is something I find truly rewarding. Not only does it make the environment a cleaner and more enriching place, but every dollar we save in energy, can be applied to mission readiness for the warfighter.

Since 2010, we have lowered the Command's energy usage by over 22 percent and our water usage by over 31 percent while adding over 179,000 square feet of space, by optimizing our systems. In fact, our energy-saving projects have gained us an annual savings of \$2.4M per year and more than \$100,000 in rebates in 2013 alone. The savings gained through rebates allows us to design, develop, and execute future energy and


water conservation projects. As a disabled Navy veteran, I am fortunate to continue supporting the warfighter in my daily operations.

Defending our country is an important and expensive task. Energy commodity costs, such as oil pricing, are some of the most volatile commodities on the face of the planet. To truly future-proof against higher utility costs, we need to use only the amount of energy we need and eliminate the waste streams.

Conserving energy is not just our job, it's our career. Not only is it important for our Command but for future generations. We have the ability to make a difference and we can start making change right now.



 [facebook.com/NavalEnergy](https://www.facebook.com/NavalEnergy)

 @NavalEnergy

<http://greenfleet.dodlive.mil/energy>

Naval Base San Diego, Camp Pendleton Host Inaugural SECNAV Energy Training Events

ASN (EI&E) McGinn Delivers Keynotes; Hundreds of Sailors & Marines Share Energy Efficient Ideas & Best Practices

NAVAL BASE SAN Diego and Marine Corps Base Camp Pendleton hosted several hundred Navy and Marine Corps operational, unit-level leaders for the first-ever Secretary of the Navy (SECNAV) energy training events on February 11 and 13, 2014. These events highlighted the latest developments that the Department of the Navy (DON) is pursuing based on SECNAV, Chief of Naval Operations (CNO), and Commandant of the Marine Corps (CMC) energy goals, and provided training to help deck plate Sailors and fleet Marines apply best energy conservation practices.

“Achieving major reductions in energy consumption will depend on decisions by individual Sailors and Marines who operate combat systems and equipment every day,” said Rear Admiral Kevin Slates regarding the event.



The U.S. Navy Event: Tuesday, February 11, 2014 at Naval Base San Diego

LCDR Will Hagan from Commander, U.S. Pacific Fleet, the driving force behind the Navy event at NBSD, assembled the “right people” to identify better energy conservation management practices for

the Fleet. That included operators who execute tasking; Fleet planners and schedulers who provide that tasking; and the Systems Commands (e.g., Naval Sea Systems Command, Naval Air Systems Command) that are bringing new technologies to the Fleet including the use of biofuels, hybrid electric drives for destroyers and amphibious ships, and analyzing procedures like Short-cycle Mission and Recovery Tanking (SMART) in-flight refueling that have the potential to save millions in fuel.

The San Diego event was divided into a morning plenary session where Navy leadership framed the issues for participants, and an afternoon of working sessions of Fleet operators to brainstorm good ideas for conserving energy resources—in essence a practical dialogue among representatives from the Type Commands, System Commands, and deckplate leadership.

Admiral Harry B. Harris Jr. Commander, U.S. Pacific Fleet

As the first speaker, Admiral Harry B. Harris, Jr., commander, U.S. Pacific Fleet set the tone for the day's



Achieving major reductions in energy consumption will depend on decisions by individual Sailors and Marines who operate combat systems and equipment every day.

—Rear Admiral Kevin Slates

events when he said, “Energy conservation and management are a critical part of our readiness. We need to be ready to fight tonight—in the Pacific and across the globe. Energy conservation is an effective tool that gives our forces an edge over any potential adversary we may face. The navy with the greatest at-sea endurance has the advantage. And that needs to be us, every time.”

As a warfighting commander, Admiral Harris spent time working with his State of Hawaii partners on several energy initiatives like the solar array that is going in at Waipio. He also welcomed the City and County of Honolulu’s ongoing planning of the elevated light rail system that will make a difference in providing needed congestion relief. He also approved further study of Pearl Harbor as a candidate for a Liquefied Natural Gas terminal.

The SECNAV’s Energy Goals

AS DON WORKS to reduce energy consumption and lead the nation toward energy independence, the SECNAV has outlined five energy goals. These goals seek to enhance and better enable our combat capabilities, to provide greater energy security. Outlined below are examples of how the Navy is moving forward to achieving each of the goals.

1. Increase Alternative Energy Use DON-wide

By 2020, 50 percent of total DON energy consumption will come from alternative sources.

- Continue aggressive pursuit of both large and small scale renewable energy projects on or near DON installations.
- Partner with industry, commercial aviation, and other government agencies to develop a demand signal to alternative fuel industry and encourage growth of a domestically produced, cost competitive biofuel industry.
- Decrease energy consumption, both ashore and afloat, through installation of energy efficient technologies and development of policies that encourage energy awareness and conservation.

2. Increase Alternative Energy Ashore

By 2020, DON will produce at least 50 percent of shore-based energy requirements from alternative sources.

- Continue installation of energy efficient upgrades to buildings and facilities.
- Encourage military members and families to conserve energy through incentives and other programs to empower them to save and be aware of their own energy consumption.
- Produce or consume one Gigawatt of new, renewable energy to power naval installations across the country using existing

authorities such as Power Purchase Agreements, enhanced use leases, and joint ventures.

3. Sail the “Great Green Fleet”

By 2012, DON will demonstrate a Green Strike Group in local operations and sail it by 2016.

- In 2012, DON successfully demonstrated a Green Strike Group at the Rim of the Pacific exercise off Hawaii.
- The DON remains focused and on track to sail the Great Green Fleet by 2016—ushering in the “new normal” where biofuels will be a constant and regular part of our operational platforms.

4. Reduce Non-Tactical Petroleum Use

By 2015, DON will reduce petroleum use in the commercial vehicle fleet by 50 percent.

- Increase purchase and use of flex fuel vehicles, hybrid electric vehicles, and neighborhood electric vehicles.
- Expand alternative fuel infrastructure to support these vehicles.

5. Energy Efficient Acquisition

Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings.

- Create a standardized process for determination of lifecycle energy costs, fully-burdened cost of energy and other energy related characteristics of potential platforms, weapons systems, and buildings.
- Encourage contractors to minimize energy footprint and factor energy into the acquisition decision making process.

Admiral Harry B. Harris, Jr. addresses the crowd assembled at the first SECNAV energy training event held in San Diego on February 11, 2014.



Admiral Harris is personally involved in energy issues because he believes that “it will help us to be a better warfighting force, to be where it matters, when it matters—just as we were a few months ago for Operation Damayan, when our naval forces responded to assist the people of the Philippines in the wake of one of the most powerful typhoons in recorded history. We couldn’t do that unless we were already there. Forward presence matters.”

But no matter how vast it is, Admiral Harris views the Pacific not as something that separates us from our allies, partners and friends, but rather a pathway that binds us together. “This tyranny of distance goes a long way in explaining why fuel is essential and why energy efficiency matters,” said Admiral Harris.

There was a sense of urgency in Admiral Harris’ remarks when he encouraged participants to “adapt today” so that we are relevant tomorrow. He said, “Energy efficiency is something we can’t defer to tomorrow. We must advance energy efficiency at the operational level today. And from my experience, there is no force or organization as adaptive and innovative as the United States Navy,” he said.

Admiral Harris was confident that the SECNAV’s energy goals for 2020 will be met. “When you think about our Navy’s nuclear platforms, and the ships and aircraft powered by biofuels, we’re well postured to reach SECNAV’s and CNO’s energy conservation goals for 2020,” he said.

The navy with the greatest at-sea
endurance has the advantage.
And that needs to be us,
every time.

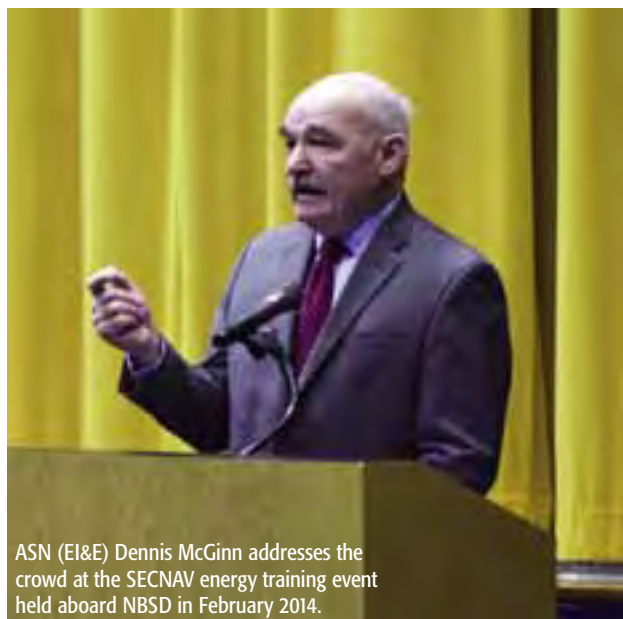
—Admiral Harry B. Harris, Jr.

“They are concrete, challenging and achievable,” he said. He encouraged those in attendance—the “right people in the room”—to change their mindsets, promote sound energy practices in what they do, and walk the walk. “Instead of saving energy when you can, save energy unless you can’t,” he said.

Admiral Harris concluded his remarks by introducing the Honorable Mr. Dennis McGinn, Assistant Secretary of the Navy for Energy, Installations and Environment (ASN (EI&E))—someone with the education and the experience needed to lead the Navy’s energy conservation efforts.

Mr. Dennis McGinn
Assistant Secretary of the Navy
(Energy, Installations and Environment)

ASN (EI&E) Dennis McGinn delivered the keynote remarks at both the San Diego event and a similar event held later in the week at Camp Pendleton. “These events are part of the Department of the Navy’s (DON) continuing effort to increase awareness of the need for all of us to reduce



ASN (EI&E) Dennis McGinn addresses the crowd at the SECNAV energy training event held aboard NBSD in February 2014.

We need to squeeze the maximum amount of mission readiness out of every drop of oil and every kilowatt of electricity.

—ASN (EI&E) Dennis McGinn

energy consumption,” said McGinn. “We want to learn more from each other—about how important operational readiness is.”

Mr. McGinn argued that seventy years ago, Admiral Chester W. Nimitz (the legendary figure who commanded the Pacific Fleet in World War II) would have been just as concerned about energy as we are today. The age of petroleum—of “easy oil”—has been very good to the U.S. and the Navy. “But we have to be concerned about the supply of this quantity that has been so good to us. We don’t want to see conflicts

around the world over the supply of oil,” he said.

“We can’t assume that the way it has always been is the way that it will always be,” said Mr. McGinn. “We need to squeeze the maximum amount of mission readiness out of every drop of oil and every kilowatt of electricity. And we do that through energy conservation and energy efficiency.”

Mr. McGinn urged the assembled operators to share their stories about how their sound energy practices are contributing to the Navy’s mission readiness. “Energy and the

Navy and Marine Corps are inextricably linked,” he said. “Business as usual is not going to get us there. We need to watch the throttle of our F/A-18s, plan a better, more efficient course for our DDGs.”

“This problem is not going to be solved in Washington,” he said. “It’s going to be solved by the people in this room. And we don’t want to be out of gas and out of ideas. We have the ability to identify and employ the best energy conservation practices and better ideas that allow us to be a better, more efficient Navy. Let’s do that today.”

The Basics About ASN (EI&E) Dennis McGinn

MR. MCGINN SERVED 35 years in uniform, having been a fighter pilot, a test pilot and the commanding officer of USS Wichita (AOR-1) (an oiler), and USS Ranger (CV 61). He returned to San Diego as the commander of the U.S. Third Fleet. In his last assignment in a Navy uniform, he was the Deputy Chief of Naval Operations for Warfare Requirements and Programs where he oversaw the development of all future Navy capabilities.

During his tenure with the Navy, Mr. McGinn had a reputation in the Fleet for an uncanny ability to cut through the bureaucracy to get to the heart of the matter—simply, quickly and effectively.

He’s been a past member of several steering committees that are especially applicable here, including the Energy Future Coalition, the United States Energy Security Council, and the Bipartisan Policy Center Energy Board. He was also the former President of the American Council on Renewable Energy, co-chair of the CNA Military Advisory Board, and an international security senior fellow at Rocky Mountain Institute.

For much more information about Mr. McGinn, his experience and plans for the Navy, read our spotlight interview in the winter-14 issue of *Currents*. You can find that interview and much more on the DON’s Energy, Environment and Climate Change web site at <http://greenfleet.dodlive.mil/currents-magazine>.



USS Peleliu & USS McClusky Recognized for Superior Energy Conservation Accomplishments

AT THE SAN Diego event, Mr. McGinn presented SECNAV Energy and Water Management Awards to representatives from USS Peleliu (LHA 5) and USS McClusky (FFG 41). With these awards, DoN recognizes outstanding commitment to energy and water management by Navy ships as well as Navy and Marine Corps installations and squadrons.

These awards are presented to those ships that have made notable progress toward DoN goals to reduce energy and water consumption and increase use of renewable energy sources. The DoN energy program evaluates and classifies the overall energy and water management performance of each ship, ranking them according to a system of SECNAV winner, platinum, gold or blue level of achievement.

USS Peleliu SECNAV Energy Conservation Award Large Hull Category Big Deck Amphibious Assault Ship

Compared to the average fuel usage of ships of the same class, Peleliu saved 37,231 barrels of fuel during the evaluation period—a savings of \$5,332,000. The award recognizes the ship's commitment to energy conservation strategies, techniques and training.

Peleliu was able to achieve these fuel savings due to a concerted effort on all fronts. NAVSEA's incentivized Energy Conservation (iENCON) program procedures are strictly enforced and followed by every crew member. Some of the Peleliu's energy-saving techniques include:

- Equipment operating logs are reviewed on an hourly basis to ensure all machinery is operating within design parameters.
- Routine boiler flexes ensure the propulsion boilers are operating above established guidelines.

- Optimum trim and draft is maintained at all times.
- Daily planning utilizes the ship's total fuel consumption curves.

In addition to the SECNAV award, Peleliu has the distinction of being the only ship ever to rank among Pacific Fleet's top five ships in underburn for three consecutive quarters.

USS McClusky SECNAV Gold Energy Award Small Ship Category Frigate

USS McClusky saved 9,118 barrels (or \$1,305,000) of fuel in one fiscal year versus the FFG 7 class average. This savings is the direct result of commitment on all levels, and to practices and techniques gained through NAVSEA's iENCON training program.



FROM LEFT: Vice Admiral Tom Copeman, Commander, Naval Surface Forces, U.S. Pacific Fleet, Lieutenant, j.g. Chase Burge of USS McClusky, and Captain Mike Elliott, Destroyer Squadron ONE Commodore, receive a SECNAV gold achievement energy award from ASN (EI&E) Dennis McGinn and Admiral Harry B. Harris, Jr. while Lieutenant Commander Will Hagan, Pacific Fleet shipboard conservation manager, narrates.

Some of the factors contributing to this achievement:

- Pre-deployment maintenance to ensure that the main engines are operating at top efficiency.
- Pre-deployment inspection of all four ship service diesel generators and correction of any discrepancies.
- Careful mission planning to eliminate needless mileage and allow more slow-speed patrols.
- Meticulous log keeping which allows the crew to continuously optimize fuel consumption without sacrificing mission readiness.

For more information about the SECNAV energy awards, visit www.i-encon.com/13awardcriteria.htm or contact Chris Tindal at 901-874-9292, DSN: 882-9292, and chris.tindal@navy.mil.



FROM LEFT: Captain Paul Spedero, commanding officer of USS Peleliu, receives the SECNAV Energy Award from ASN (EI&E) Dennis McGinn and Admiral Harry B. Harris, Jr.

Rear Admiral Kevin D. Slates
Director, Chief of Naval Operations Energy and
Environmental Readiness Division

Mr. McGinn's comment about not being out of gas and out of ideas rang true with Rear Admiral Kevin D. Slates, director of the Chief of Naval Operations Energy and Environmental Readiness Division (CNO N45). Admiral Slates pointed out that petroleum is a limited resource subject to sudden price increases in the global marketplace as world events unfold. These supply and price issues become an increasing concern as many of the Navy's new systems use fuel at a higher rate than legacy platforms to achieve increased combat capability. The Navy is also moving toward systems like the electromagnetic railgun and directed energy weapons that will depend on gas tanks instead of explosives to achieve their kinetic effect. "These factors make it all the more important to find ways to conserve fuel in our platforms everywhere, all the time, unless we cannot," said Admiral Slates.

In his remarks, Admiral Slates emphasized the focus on at-sea endurance. "Energy is a great enabler, but it is also a great liability. If our adversaries shut down our energy supply, or if an oiler can't get to the Fleet, that's a real risk," he said.



Rear Admiral Kevin Slates addresses the crowd assembled during the plenary session at the SECNAV energy training event held in San Diego on February 11, 2014.

MC Seaman Amanda Chavez

Before leaving the stage, Admiral Slates encouraged those assembled in the NBSD Theater to look at the added capability that nuclear power gave us and "be that innovative." "The real ideas, the great ideas come from the Fleet."

The real ideas, the great ideas come from the Fleet.

—Rear Admiral Kevin D. Slates

When aviators, surface and expeditionary warriors, and the host of technicians who keep the equipment running truly understand how energy efficiency enables combat capability and can save lives, they can apply their analytical minds to solve energy problems in a practical way that meets mission requirements with less fuel. As Admiral Slates said, "As vital as new technology is, we won't achieve energy efficiency fast enough, if at all, with technology alone. We have to re-think how we use and value energy with the platforms we have. We need to incorporate energy efficient practices into the acquisition process and design our systems with efficiencies that increase our capacity downstream."

The Systems Commands are already helping the Navy achieve energy independence through a variety of mechanisms including stern flaps, the energy dashboard, LED lighting and hybrid electric drives. According to Admiral Slates, "Putting innovative systems on our ships is a game changer."

We have the most innovative thinkers in the Navy—the best that our country has to offer," said Admiral Slates. "We need to extend our reach, our combat capability. So what can we do to extend that capability? How can we operate our platforms more efficiently?"

Rear Admiral Alma Grocki
Director of Fleet Maintenance, U.S. Pacific Fleet

Rear Admiral Alma Grocki, director of fleet maintenance, U.S. Pacific Fleet, followed Admiral Slates with her own energy conservation vision and strategy.

Admiral Grocki said, "Our focus is on operational energy and the compelling reasons to change how we perceive and use energy at our installations and in our operations. While we are investing in modernizing our equipment and the Fleet to deliver the needed capability with more fight and less energy, we recognize that technology alone will not get us there."



Rear Admiral Alma Grocki shares her views on energy conservation during the San Diego SECNAV energy training event.
MC Seaman Amanda Chavez

Admiral Grocki provided some interesting statistics in her brief, including the fact that the Navy accounts for 28 percent of the Department of Defense's (DoD) total energy consumption. She noted that, "The Fleet is moving from limited, local initiatives to compulsory, Fleet-wide practice."

"By using less energy, we will increase our operational range and time on station, reduce logistical vulnerabilities and conserve resources that can be applied to other priorities," said Grocki. "We'll get a return on our investment," she said, "but we need to measure our progress along the way."

Admiral Grocki concluded her remarks by saying, "This is not a short-term problem. But with all of your help to shape and carry the message forward, we can complete the missions that the Navy has in store for us." She encouraged the operators in attendance to identify good ideas that promote energy conservation as well as the strategies to convert those ideas into Fleet-wide best practices.

More Presentations from the U.S. Pacific Fleet & Other Organizations

Once these senior Navy officials completed their remarks, they were followed by a number of other presentations given by the personnel listed in the table below.

WHO	ORGANIZATION	WHAT
CAPT Richard A. Rogers CAPT Ryan B. Scholl	Commander, Naval Air Force, U.S. Pacific Fleet	<ul style="list-style-type: none"> ■ Increasing energy conservation aboard aircraft carriers ■ Implementing improvements to reduce aviation fuel usage ■ Launching the Naval Aviation Energy Conservation (Air ENCON) program to establish an enterprise-wide program that reduces reliance on petroleum
CDR Bill Partington	Commander, Naval Surface Force, U.S. Pacific Fleet	<ul style="list-style-type: none"> ■ Executing a multi-pronged approach to reduce surface ship energy consumption while underway (including stern flap and solid state lighting installation) ■ Planning for deployment of the Great Green Fleet in 2016
CDR Brien Dickson	Commander, Submarine Force, U.S. Pacific Fleet	<ul style="list-style-type: none"> ■ Planning for pierside metering, biofuels for emergency diesel engines, and antifouling coatings on submarine topside surfaces
Mr. Sonjae Whang	Military Sealift Command	<ul style="list-style-type: none"> ■ Implementing the Energy Management Dashboard which more accurately assesses shipboard energy conservation underway and in port ■ Execute an energy training program that focuses on improving on-board operating practices for better energy efficiency
CAPT Marc Delao	Navy Expeditionary Combat Command (NECC)	<ul style="list-style-type: none"> ■ Implementing the NECC energy strategy including the cost effectiveness and commonality of parts, equipment, systems and procedures, partnering with other Services to support equipment refresh and modernization efforts, and leveraging other DoD and commercial initiatives

By using less energy, we will increase our operational range and time on station, reduce logistical vulnerabilities and conserve resources that can be applied to other priorities.

—Rear Admiral Alma Grocki

Tom Martin of the Naval Sea Systems Command (NAVSEA) and co-chairman of the Navy's Maritime Working Group, described energy-saving initiatives such as the variable speed drive port use fan, solid state lighting, combustion trim loop, directional stability and stern flaps. "Some of these initiatives will save energy regardless of the operator, while other technologies are enablers," he said.

Afternoon Breakout Sessions

In an effort to identify energy challenges and solutions, participants had the option to attend one of the following three afternoon breakout sessions on maritime energy, aviation energy and expeditionary energy.

During each of these sessions, participants discussed possible ideas for promoting energy efficient practices across the Fleet, the challenges associated with implementing those practice, and good ideas to address those challenges. The results of each of these breakout sessions will form the basis of good ideas that will be carried forward for future investigation and application.

After the San Diego event concluded, Admiral Slates reflected on the training event in his own blog posting (on http://www.navy.mil/submit/display.asp?story_id=79092) when he said, "We are still in a very challenging fiscal environment, which limits opportunities for training. So we have to do our best to ensure each training event provides maximum value for our warfighters in support of Fleet readiness. Admiral Harris' team and the participants in the San Diego event succeeded in that regard—they



Participants had the chance to record their energy ideas and feedback on the SECNAV energy training event at the CNO N45 booth.

Kenneth Hess

made practical headway for the Navy in the energy realm and it was a privilege to be a part of it."

Following the event, Mr. McGinn visited USS Dewey (DDG 105), where he met with crew members to discuss energy conservation and its impact on operational readiness.

Also on hand during the San Diego event was a video crew that recorded the leadership remarks as well as the awards ceremony. In the afternoon, the video crew recorded comments from individual Sailors about this training, including their good ideas for making the Navy a wiser energy user. This provided the assembled Sailors with an opportunity to be the "eyes and ears" of the Fleet and help make a difference. The public affairs team from U.S. Pacific Fleet, Navy Region Southwest and CNO N45 will use these video clips for press releases, articles,

and social media posts to help get the word out about these training events and the Navy's ongoing energy conservation efforts.



The U.S. Marine Corps Event: Thursday, February 13, 2014 at Marine Corps Base Camp Pendleton

The United States Marine Corps (USMC) conducted a similar, one-day energy training event on February 13, 2014, at MCB Camp Pendleton designed to take the energy message of the SECNAV and the CMC to unit-level leaders in the Fleet. The intent behind this event was fourfold:

1. Communicate the Marine Corps' energy challenges directly to the Fleet.
2. Explain energy constraints on both installation and Marine Air Ground Task Force operations.
3. Educate Marines about how they can be part of the solution.
4. Allow ASN (EI&E) McGinn to hear directly from Marines about how energy affects their operations.

Getting Marines to understand the energy problem and their role in tackling it will jump-start a critical energy culture change in the Marine Corps.

In attendance for this event, were general officers, battalion and squadron commanders and sergeant majors, logistics officers and chiefs, and senior base energy management personnel. Their participation ensured that the SECNAV and CMC energy message was communicated to every level of the operating forces.

During the early morning hours of the Camp Pendleton event, Mr. McGinn held a number of roundtable discussions with senior Marine Corps leadership so that he could share his vision for an energy efficient Marine Corps and get their perspectives on energy conservation including:

1. LtGen Toolan (I MEF)
2. MajGen Nicholson (1st MARDIV)
3. MajGen Berger (29 Palms)
4. MajGen Ayala (MCICOM)
5. BGen Bullard (MCI West-Camp Pendleton)
6. BGen Mundy (III MEF)
7. BGen Coglianese (1st MLG)

Mr. McGinn also provided the opening remarks at the training session for logistics officers and chiefs and senior base energy personnel.

Mr. Dennis McGinn Assistant Secretary of the Navy (Energy, Installations and Environment)

"The SECNAV, CMC and the chain of command are all focused on energy," said Mr. McGinn. "And although energy technology and our partnerships with utility companies are very important, a pronounced culture change is going to make the biggest difference about how we become a more effective fighting force. Everybody up and down the chain of the command really has to understand that energy is essential to us as a nation and we can do something about it no matter what kind of technology we have."

"Think about energy as ammunition," said Mr. McGinn. "You don't go out to the field and just indiscriminately fire—you are always mindful that the supply of bullets, bombs and missiles is limited. Energy is exactly the same way."



ASN (EI&E) McGinn addresses participants at the second SECNAV energy training event held aboard Camp Pendleton in February 2014.

Kenneth Hess

ASN (EI&E) McGinn Tours Energy Projects at Camp Pendleton

AFTER KICKING OFF the MCB Camp Pendleton training event, Mr. McGinn along with senior military personnel visited several energy projects on base including the site of the largest photovoltaic (PV) array at a west coast Marine Corps base on a closed landfill at Box Canyon. As a rule, solar array systems require open, minimally shaded space and proximity to roads and power transmission lines. Closed landfills that are otherwise unavailable for development often meet PV-siting requirements. The solar panels on the Box Canyon site are installed on an aluminum and steel racking system that is secured by 3,500-pound concrete ballasts. The ballasts are placed on gravel pads to allow rainwater to flow through without affecting the landfill cap.

It is estimated that it will save the Marine Corps \$336,000 per year in electricity costs. The first phase of the array covers approximately five acres and includes 225 panels, each holding 28 modules for a total of 6,300 modules. The size of the system is 1.485 megawatts of direct current and in Fiscal Year (FY) 2013 generated 2,448,108 kilowatt hours of electricity and saved \$342,735 in electricity costs. The second phase was activated in June 2013 and generated 780,407 kWh of electricity by the end of FY 2013.

For more information about the Box Canyon solar array, read our article entitled "Landfill to Lighting: Closed Pendleton Landfill Becomes Home to Solar Arrays" in the summer 2012 issue of *Currents*.



From left, Charles Howell, ASN (EI&E) Dennis McGinn, Navy Capt. Charles R. Reuning and Lt. Cmdr. Ben Wainwright talk about the Phase I and Phase II photovoltaic array (solar panels) at Box Canyon aboard MCB Camp Pendleton during Mr. McGinn's tour of the base.

Cpl. Brianna Christensen



Box Canyon solar array.



Lake O'Neill aboard MCB Camp Pendleton.
Cpl. Brianna Christensen

Mr. McGinn and his entourage then visited the water reservoir at Lake O'Neill as well as the former base hospital (building H-100) that will be converted into an energy efficient administrative facility for approximately 2,350 base and tenant command staff. The conversion will include renovation and modernization of the interior space, upgrading utility systems and underground communication lines, a structural/seismic retrofit and construction of additional parking spaces.

There is no silver bullet that is going to solve all of our energy concerns and challenges. There is, however, silver buckshot; a little bit here and a little bit there is absolutely going to make a difference.

—ASN (EI&E) Dennis McGinn

“I want to leave you with an appreciation for how absolutely essential and inexplicably tied our mission readiness is to the kinds of energy we have and how we use it,” said Mr. McGinn. “There is no silver bullet of technology that is going to solve all of our energy concerns and challenges,” said Mr. McGinn. “There is, however, silver buckshot; a little bit here and a little bit there is absolutely going to make a difference.”

After concluding his remarks and having lunch with senior military officials, Mr. McGinn left the Pacific Views Event Center along with senior military personnel from Camp Pendleton to visit a number of energy projects on the base.

Colonel James C. Caley **USMC Expeditionary Energy Office**

After Mr. McGinn’s remarks, Colonel James C. Caley from the USMC Expeditionary Energy Office discussed the challenges facing the Marine Corps in the operational energy arena.

Colonel Caley’s first question posed to the assembled Marines was, “How can we change our ethos—our guiding principles—as it pertains to operational energy? From 2001 to 2014, the fuel consumption of our infantry battalions increased exponentially. “Our trucks idle 50 to 70 percent of the time, at zero miles per gallon, and half of that time is inside our fenceline. Our generators run 65 percent of time powering nothing. That’s an ethos we need to change,” said Colonel Caley.

Colonel Caley emphasized that his team can’t solve the Marine Corps’ energy problem from headquarters. Commanders on the ground understand their own needs and solutions better than he does. He challenged the Marines in the audience to “be a part of the solution” and tell him what else the Marine Corps can be doing to reduce fuel consumption.

Colonel Caley highlighted the three Programs of Record (POR) for renewable energy systems:

1. **Solar Powered Alternative Communications Energy System (SPACES)**

SPACES is a lightweight, portable, renewable energy system designed to provide power for platoon- and squad-size units operating in remote locations. Marines use SPACES to recharge batteries that power communications equipment like satellite radios, reducing the number of batteries carried on extended patrols.

2. **Ground Renewable Expeditionary Energy Network System (GREENS)**

GREENS is a portable power generation system that incorporates solar panels, energy storage and AC/DC power sources. GREENS provides an average contin-



Colonel James C. Caley speaks about the importance of energy conservation at the Pacific Views Event Center aboard MCB Camp Pendleton.

Cpl. Orrin G. Farmer

uous output of 300 watts or 1,000 watts peak—enough to power a battalion combat operations center. Marines also use GREENS to power the High Mobility Artillery Rocket System and the Ultralightweight Field Howitzer, eliminating the need to tow a 3-kilowatt generator and reducing vehicle idle time.

3. Hybrid Power

Hybrid power generation—combining batteries, solar, and smart controls with traditional diesel generators—has demonstrated up to 50 percent fuel savings and up to 80 percent reduced generator run time. The Marine Corps is working closely with the Army to develop joint requirements for hybrid power systems that will increase the combat effectiveness of both services.

For more information about these and other energy conservation efforts underway, visit E2O's web site at www.hqmc.marines.mil/e2o.



Before turning over the microphone to the next speaker, Colonel Caley distributed a form to audience members to capture the following information:

1. What other technologies could help the Marine Corps reduce its fuel/power use?
2. What other energy behavior changes should be tackled?
3. How can we further change our ethos?

EXFOB demo.
Kenneth Hess



There was also space on the form for attendees to provide feedback on the value of this training session. Colonel Caley and his team will compile the results of these forms and identify other potential technologies and solutions to help the Marine Corps reduce its energy consumption.

Colonel Caley then guided the audience through a brief that highlighted the history, impact and future of the Experimental Forward Operating Base (ExFOB).

Created by the Commandant in 2009, ExFOB brings together stakeholders from across the Marine Corps requirements, acquisition and technology development communities in a dynamic process to quickly evaluate and deploy technologies that reduce battlefield energy and water requirements.

Once per year, the Marine Corps invites select industry participants to ExFOB to demonstrate off-the-shelf technologies with the potential to address current Marine Corps capability gaps. Following the demonstration, promising technologies will be evaluated in a controlled laboratory environment and then put into the hands of Marines for field testing in combat conditions. Laboratory and field evaluation results will inform requirements development and may ultimately lead to fielding of systems in support of a more combat-effective fighting force.

Through the ExFOB process, the Marine Corps brings energy efficient technology from “concept to combat.” Once fielded, energy and water technologies first demon-

Getting Marines to understand the energy problem and their role in tackling it will jump-start a critical energy culture change in the Marine Corps.

strated at ExFOB will increase the operational reach of the force. Specific capability gains expected from these systems include:

- Power patrol bases entirely on renewable energy.
- Conduct extended foot patrols with limited or no fuel or battery resupply.
- Lighten the carried load of batteries and water for a 96-hour patrol from approximately 65 pounds to approximately seven pounds.
- Reduce the need to carry multiple types of batteries.
- Reduce generator runtime by up to 80 percent and generator fuel use by up to 50 percent.
- Increase fuel efficiency of the Medium Tactical Vehicle Replacement (MTVR) by 25 percent or more.

The next ExFOB will be held May 12–16, 2014 at Camp Pendleton and focus on tactical energy harvesting.

Afternoon of More Presentations & Hands-on Training

Rounding out the afternoon at the Camp Pendleton event were the following two presentations:

1. The Commander's Energy Readiness Program

Whether in training or on the battlefield, every Marine knows exactly how much ammunition he has. Marines do not have that same level of visibility over their energy supply. By direction from the CMC, E2O is working to raise awareness in the Fleet and enable Marines to manage their fuel, just as they manage their ammunition. The Commander's Energy Readiness Program (CERP), launched in 2013, arms battalion and squadron commanders with fuel and power data, enabling them to plan and make decisions that can increase training days or extend operational reach. As budgets decline, programs like CERP will ensure that Marines extract the most readiness out of every gallon of fuel they use. CERP will pave the way for a Marine Corps Order that standardizes energy management across the operating forces, as well as a full-scale metering program that will inform operational planning at all levels of MAGTF.

2. Marine Corps Installations Command (MCICOM) and Marine Corps Installations-West (MCI-West (Camp Pendleton)) Installation Energy Programs

MCICOM Facilities Director, CAPT Pat Garin opened the installations session with the G-4's and Senior enlisted

A Marine drives an MTVR onto the beach during roll-on/roll-off discharge facility operations.

MC2 Bryan Niegel





Attendees at the MCB Camp Pendleton event received training on two of the POR energy systems that have been fielded to the Fleet including GREENS and SPACES.

to provide an overall perspective about how installations energy supports the Marine Corps mission, providing the platform from which Marines train and deploy. Responsible management of installations energy not only takes advantage of recent facilities improvements, but requires the efforts of everyone on Marine Corps bases to use energy wisely. MCICOM SgtMaj Ploskonka further emphasized the personal buy-in and approach needed to really develop an energy “ethos” in day-to-day events. Bob Gilleskie, MCIWEST Energy Manager and Jeff Allen, Camp Pendleton Energy Manager then provided an overview of efficiency and renewable energy initiatives under way and planned for the region and the base. Finally, Aaron Fielder, a Regional Energy Advisor for MCIWEST with Booz Allen Hamilton, and former Marine, discussed the upcoming Unit Energy Manager Program that will

provide a means for installations energy managers to interact with base units and work to really manage unit energy use.

The first Marine Corps SECNAV energy training event concluded as attendees went outside of the Pacific Views Event Center to receive training on two of the POR energy systems that have been fielded to the Fleet including GREENS and SPACES.

At the end of the day, the assembled Marines had a better appreciation of the Marine Corps’ energy challenges, increased understanding of existing operational and installation energy efforts, enhanced awareness of future energy efforts, and practical skills from hands-on equipment training.

A third SECNAV energy training event was hosted by U.S. Fleet Forces Command at Naval Station Norfolk on March 25, 2014. For more information about this event, contact Ted Brown, Public Affairs Officer at U.S. Fleet Forces Command at 757-836-4427

and theodore.brown@navy.mil or see our article in the summer 2014 issue of *Currents*. The fourth and final energy training event was scheduled for April 30, 2014, at Marine Corps Base Camp Lejuene. For more information about this event, contact Katie Hantson at the information provided below. 📍

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Sonobuoys Play Valuable Role in Marine Mammal Research & Monitoring

LMR Program Now Manages Allocations to Support New & Ongoing Data Collection Efforts

SONOBUOYS, MOST OFTEN used by the Navy for submarine detection, have also proven to be a valuable asset in meeting another Navy need—understanding and monitoring marine mammals. While finding submarines continues to be the primary sonobuoy use, sonobuoys have proven remarkably valuable in marine mammal research and monitoring. From surveys of hard-to-find whale populations off Alaska to complementing marine mammal survey work off California, sonobuoys have contributed important information that supports Navy at-sea environmental stewardship.

Background on Sonobuoys

Sonobuoys are expendable underwater listening devices that the Navy typically employs for submarine detection, classification and location. Although models and capabilities vary, sonobuoys generally include a float (i.e., buoy), radio transmitter, battery and a hydrophone attached to a wire for detecting sound under water. Relatively inexpensive, simple and compact, sonobuoys are one of the most useful tools for monitoring underwater sound. They are well suited to marine mammal work—their frequency detection ranges encompass many whale sounds, and they can be deployed from both aircraft and ships.

The sonobuoy battery has a limited shelf life and the devices carry an expiration date. Once past the expiration date, they previously were categorized as surplus. Unused expired devices eventually were sent to a Navy location to be demilitarized and broken down into parts for disposal, a process that incurred shipping, labor and disposal costs.



Sonobuoys ready to be loaded for deployment.

Jeff Foster

Prior to 2009, some marine mammal researchers recognized the potential benefits of using the buoys as passive monitoring devices and often requested expired devices for their research. The success rate of expired devices, however, varied greatly from one batch to another, limiting their value relative to the effort of storing, transporting and deploying them.

Adding Sonobuoys to Current Marine Mammal Research & Monitoring Methods

In 2009, a convergence of need and opportunity helped to make unexpired sonobuoys from the Navy's research inventory available for marine mammal research and environmental monitoring uses. There was growing recognition of the need to understand more about marine mammal presence in Naval training areas, and other marine areas, accompanied by increasing appreciation of the value of sonobuoys in meeting that need. Since the Naval Research Laboratory's (NRL) needs for sonobuoys was on the decline, the Navy's Non-Combat Expenditure Allocation (NCEA) of sonobuoys to the NRL included a quantity of unexpired sonobuoys that could be made available to researchers.

One of the first projects to employ sonobuoys from the NRL allocation was a search for the endangered North Pacific right whale (*Eubalaena japonica*), one of the



Small spaces require efficient set-up—acoustic receiving and processing equipment on rear of plane seat; “belly port” through which sonobuoys will be deployed is seen below.

Brenda K. Rone

The Basics About Passive Acoustic Monitoring

PASSIVE ACOUSTIC MONITORING (PAM) refers to listening for sounds underwater; in the case of marine mammals, listening for calls, whistles, clicks and other sounds that can help researchers determine presence and activity. Marine mammals can be difficult to locate visually due to behavior, weather, light levels and other variables. PAM devices make it possible to collect data under sub-optimal visual conditions and also provide valuable insights when combined with visual data. These devices also help researchers monitor large ocean areas that would be difficult and costly to monitor visually.

In addition to sonobuoys, many types of devices can be used to collect PAM data. The Navy maintains instrumented acoustic ranges that contain fixed, seafloor-mounted hydrophones (i.e., underwater microphones). Towed arrays are hydrophone sets towed by a ship. Sonobuoys are expendable PAM devices that can be deployed from a ship or aircraft. Newer developments in PAM devices include bottom-mounted High-frequency Acoustic Recording Packages (HARP) and autonomous unmanned vehicles equipped with PAM listening devices. Acoustic monitoring devices that can be placed on animals (“acoustic data-logging tags”) can provide a wealth of

behavioral data (diving depth, movements) linked to the acoustic data they also record.

Each device offers a different benefit. Using multiple types of devices in conjunction with other data can provide the answers the Navy needs to important questions about the marine environment and the effects of Navy activities on that environment.

PAM technology continues to develop and is opening new capabilities for learning about specific species and sub-populations, as well as informing researchers about behavior, abundance and densities, location and communication.



ABOVE: Sonobuoy about to be deployed from the belly port.

RIGHT: Sonobuoy with open parachute following deployment.

Jeff Foster



rarest large whale species. The National Marine Mammal Laboratory (NMML), part of the National Oceanic and Atmospheric Administration's (NOAA) Alaska Fisheries Science Center, realized that a small population of these right whales, perhaps as few as 40, still existed in the eastern North Pacific. Finding such a small number of whales in such a large ocean expanse presented a daunting task. In 2007 and 2008 the NMML team obtained surplus sonobuoys, which improved their ability to locate whales in poor sighting conditions. For 2009 they wanted to include non-surplus sonobuoys with aerial surveys.

At that time Dr. Robin Fitch (formerly Captain Fitch) was staff to the Assistant Secretary of the Navy's Marine

Mammal Task Force. With her support, the NMML team submitted a request for sonobuoys to the Naval Air Systems Command PMA-264 (the Air Anti-Submarine Warfare Systems Program Office). Jeff Leonhard and his team at the Sonobuoy Logistics group were able to secure Program Office approval for the use. Leonhard and Theresa Yost, who also supports PMA-264 logistics, obtained sonobuoys for NOAA NMML from the NRL allocation and provided logistical support in getting the sonobuoys to the researchers. Yost characterized the projects as exciting for the logistics team, "We had only thought of sonobuoys relative to detecting submarines; we had no idea of the impact they could have for marine species."

The sonobuoys made it possible for the NMML team to "...find a needle in a haystack." (See "Finding the Needle in the Haystack: Using Sonobuoys to Locate a Critically Endangered Species" at www.afsc.noaa.gov/Quarterly/jas2011/divrptsNMML2.htm.) Aerial observers detected right whales on more than 55 percent of the aircraft-deployed sonobuoys, a significant improvement in detections by visual sightings alone. Dr. Fitch characterizes the sonobuoys as a "game changer" for understanding the whale population that was once thought to be near extinction.

Sonobuoys also have played a key role in Navy-funded behavioral response studies (BRS). The first application of non-expired buoys to a BRS



North Pacific right whale.

Brenda K. Rone, NMML Permit #782-1719

It has been great to support these types of projects—they are good for the Navy, good for research and good for our marine stewardship.

—Jeff Leonhard

What is CalCOFI?

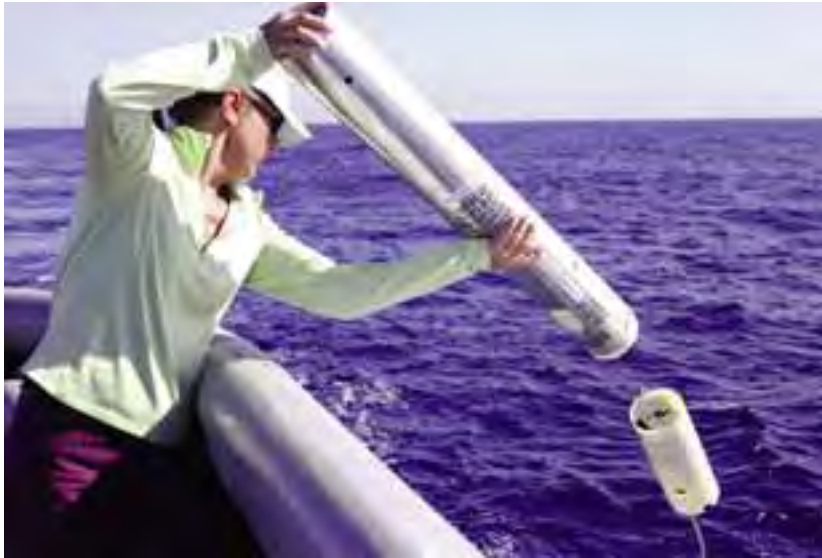
CALCOFI ORIGINATED IN 1949 in response to the sardine population collapse off California. A partnership of the California Department of Fish & Wildlife, NOAA Fisheries Service and Scripps Institution of Oceanography, CalCOFI research has expanded well beyond its original purpose and now collects data on a wide range of variables important to the marine environment and living resources off of southern and central California.

CalCOFI carries out quarterly research cruises to collect data on more than 30 physical, chemical and biological oceanographic variables both at established stations and while underway. Marine mammal visual and acoustic surveys, employing both sonobuoys and other passive acoustic devices, have been added to cruise data collection efforts.

For more details on CalCOFI and its work, see <http://calcofi.org>.

effort was the multi-organization project in the Mediterranean Sea in 2009 (MED 09 trials). This effort focused on beaked whales, which are notoriously difficult to locate, track and observe. The acoustic signals captured by both sonobuoys and ship-towed hydrophones helped the researchers properly position vessels. (For more information the MED 09 trials, see the article “Latest Behavioral Response Study Builds Upon Years of Marine Mammal Research” in the summer 2010 issue of *Currents*.) A more recent project is the ongoing BRS effort in the Southern California (SOCAL) range complex. Placing data-logging devices on animals can provide more complete behavioral data but is difficult to achieve. The sonobuoys significantly improve project success because researchers can find more animals on which to deploy the data-loggers, creating more chances for a successful tag deployment and subsequent experimental sound exposure.

Other ongoing projects that have helped the Navy build its marine mammal knowledge are those carried out by



An example of manually deploying a sonobuoy from a ship. Julie Rivers, Natural and Marine Resources Program manager at Commander, U.S. Pacific Fleet deploying a sonobuoy to listen for marine mammals in Hawaii.

Sean Hanser

California Cooperative Oceanic Fisheries Investigations (CalCOFI) partnership. As of the 2013 field season, they have deployed sonobuoys on 36 cruises. During quarterly cruises

CalCOFI collects data on more than 30 oceanographic variables. For acoustic monitoring, use a towed hydrophone array and deploy sonobuoys at their stations. This acoustic monitoring

combination supports subsequent modeling of marine animal distribution and helps to identify the likely percentage of animals that might be missed during visual counts. In one example, results have increased understanding of humpback whale presence during the winter when visual detection is limited.

Sonobuoys also are proving to be a valuable tool for monitoring during Navy Mine Warfare Exercise (MINEX) training. Anu Kumar, formally the Marine Resources Branch Head at the Naval Facilities Engineering Command (NAVFAC) Atlantic and now the Deputy Manager of the Living Marine Resources (LMR) program, and Dr. Cara Hotchkin, a Marine Resource Specialist at NAVFAC Atlantic, along with Dave Moretti from Naval Undersea Warfare Center (NUWC) Newport and Commander Carl Hager from the U.S. Naval Academy have teamed up to experiment with

The Basics About the LMR Program

THE LMR PROGRAM seeks to develop, demonstrate, and assess data and technology solutions to protect living marine resources by minimizing the environmental risks of Navy at-sea training and testing activities while preserving core Navy readiness capabilities. This mission is accomplished through the following five primary focus areas:

1. Providing science-based information to support Navy environmental effects assessments for at-sea training and testing.
2. Improving knowledge of the ecology and population dynamics of marine species of concern.
3. Developing the scientific basis for the criteria and thresholds to measure the biological effects of Navy-generated sound.
4. Improving understanding of underwater sound and sound field characterization unique to assessing the biological consequences of underwater sound (as opposed to tactical applica-

tions of underwater sound or propagation loss modeling for military communications or tactical applications).

5. Developing technologies and methods to mitigate and monitor environmental consequences to living marine resources resulting from naval activities on at-sea training and testing ranges.

The program is sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division and managed by NAVFAC out of the Naval Facilities Engineering and Expeditionary Warfare Center in Port Hueneme, California.

For more information, visit the LMR program web site at www.lmr.navy.mil or contact Bob Gisiner, the LMR Program Manager at 805-982-4853, DSN: 551-4853 or bob.gisiner@navy.mil





ABOVE: Parts of a USSI-Q53F sonobuoy after being removed from its housing.

RIGHT: Sparton Q53F sonobuoy housings.
Applied Logistics Services, Inc.



We had only thought of sonobuoys relative to detecting submarines; we had no idea of the impact they could have for marine species.

—Theresa Yost

including a shore-based receiver are scheduled for testing during the spring of 2014. Results from this test would help to simplify the equipment setup, reduce costs, and provide greater flexibility for researchers to get out in the training area to monitor for marine mammals and collect data relatively quickly and efficiently while extending the research monitoring coverage area.

sonobuoys to detect and locate marine mammals in Navy training areas. This has been a collaborative effort funded by United States Fleet Forces Command.

Most recently the team successfully acoustically detected, located, and followed bottlenose dolphins in near real-time at the MINEX range off the coast of Virginia Beach, Virginia. They temporarily moored a sonobuoy at each of the four corners of the area and a fifth sonobuoy centrally located within the range. Working at a remote location on a boat anchored outside the range and away from the training activity, the scientific crew was able to detect and locate bottlenose dolphin whistles and clicks

adjacent to and within the range in near real-time. They used a prototype portable version of the Marine Mammal Monitoring on Navy Ranges (M3R) software to process the acoustic signals from the sonobuoys. The M3R software was originally developed by NUWC for the Navy's ranges with fixed bottom-mounted hydrophones. This type of technology is still in the beginning stages of development and a few years away from being available for routine use. In the meantime, sonobuoys are proving to be an important and inexpensive platform for some types of portable monitoring capabilities.

Refinements to the M3R software and new equipment configurations

Getting the Support

The Sonobuoy Liaison Working Group (SLWG) has played an important role in supporting sonobuoy allocations to marine mammal research and monitoring. The SLWG includes representatives from the Navy branches involved in receiving and testing the sonobuoys as they come from the manufacturers; representatives from the Navy commands responsible for shipping, storing and distributing the sonobuoys; and the users in the fleets. They help to determine how many of the devices are ordered by the Navy and how many are made available to the NCEA. The SLWG is supported by the Sonobuoy Logistics group of PMA-264.

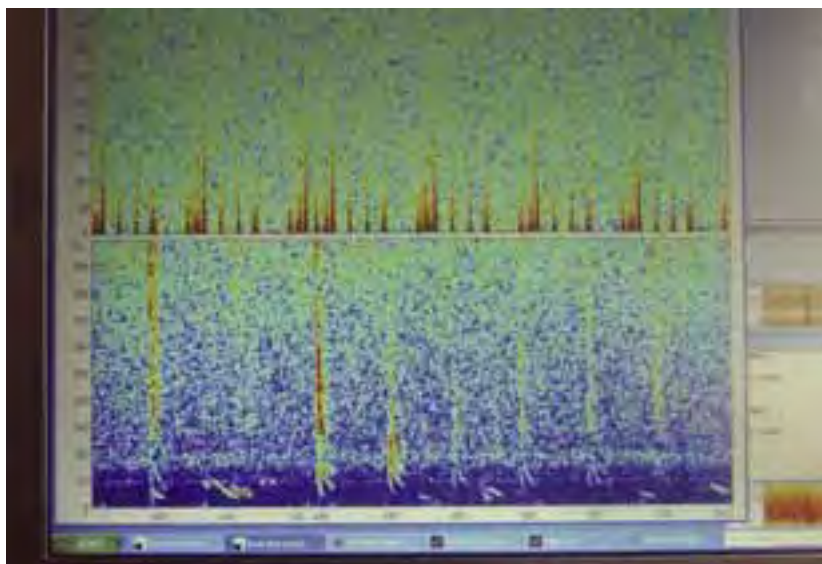


Deployed sonobuoy to acoustically detect dolphins after a MINEX operation in the Atlantic. Dolphins are visible just beyond the buoy and a visual survey vessel is seen in the distance.
Dr. Cara Hotchkin

As Jeff Leonhard noted regarding the marine mammal projects that made use of sonobuoys, “It has been great to support these types of projects—they are good for the Navy, good for research and good for our marine stewardship.” Leonhard also values the feedback received from

researchers like the NMML group regarding how the buoys worked and the type of data obtained, as well as helping his team track sonobuoy disposition. Theresa Yost added that the work the researchers do with the sonobuoys, and how they use them, is impressive.

Dr. Fitch is enthusiastic about the role of sonobuoys and the role of acoustics in marine mammal work. “We are on a great frontier with the acoustics aspect of marine mammal research. Every month researchers are learning new whale calls and are able to connect recorded sound to a specific species. Acoustic tools have helped us gain tremendous understanding of population densities, well beyond just presence and absence,” she said.



Monitoring sound signals from two channels. The lower screen displays what is called the “gunshot” sound, the call-type selected for in-flight detection of North Pacific right whales.
Brenda K. Rone

Transition to the Living Marine Resources Program

In FY 2013, the evaluation process for marine mammal-related sonobuoy requests was assigned to the LMR program. The mission of the LMR program is to develop, demonstrate, and assess information and technology solutions to protect living marine resources while preserving core Navy readiness capabilities. The Living Marine Resources Advisory Committee



North Pacific right whale.

Amy S. Kennedy, NMML Permit #782-1719

(LMRAC) includes representatives of all the major Navy Fleet and Systems Command activities affected by at-sea environmental issues.

A number of factors made the LMR program an appropriate venue for evaluating sonobuoy requests. The LMRAC's broad representation, coupled with the LMR's needs and proposal evaluation process, ensures that the main Navy stakeholders on marine mammal issues are involved in solicitations and reviews. In addition, LMR has established processes for transitioning data and technology to Navy users. These include data standards and archiving processes as well as Technology Transition Plan processes used for research and development projects.

The same review mechanism used to evaluate other marine mammal research proposals is applied to marine mammal sonobuoy requests. Following LMRAC review, the LMR program works with the SLWG on available allocations. In FY13, LMR was able to allocate 409 sonobuoys to various marine mammal research and population survey projects. The FY14 requests total 480.

As the LMR Program Manager, Dr. Robert Gisiner, points out, "The growing body of acoustics data, thanks in part to these sonobuoys, is critical to the Navy's permit application process and stewardship efforts. It helps the Navy to maintain necessary levels of realistic readiness training while minimizing the effects to marine mammals."

Summary

The sonobuoy allocation program has provided valuable support to Navy efforts in multiple areas:

- Advancing survey methodologies to meet the Navy's need for improved data on marine mammal distribution and abundance.
- Expanding species identification with improved automated signal DCL (detection, classification and localization) while reducing monitoring costs.
- Assessing the effect of Navy sound sources on mammals with improved metrics of environmental risk from Navy at-sea activities. ⚓

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Partnership Serves as a Winning Solution to Rattlesnake Conservation

Navy Joins Forces to Collect Critical Ecological Data

AFTER MORE THAN eighteen years of partnership, the U.S. Navy, Old Dominion University (ODU), and the Virginia Department of Game and Inland Fisheries (VDGIF) continue to use a very successful formula for collecting data on a state-listed rattlesnake species in southeastern Virginia—a partnership that proves to be a winning combination for all parties involved including the snakes.

The southern or Coastal Plain population of the timber rattlesnake is commonly referred to as the canebrake rattlesnake. It is a large, terrestrial, venomous snake inhabiting the southeastern United States from southeastern Virginia to eastern Texas. The VDGIF recognizes the Coastal Plain population of the timber rattlesnake (canebrake rattlesnake) as a distinct population segment based on ecological, morphological and behavioral differences and was listed as endangered in Virginia in 1992. The species is

also listed as state-endangered or threatened in the states of Connecticut, Indiana, Maryland, New Hampshire, New Jersey, Ohio, Vermont, Illinois, New York, Minnesota, and Texas.

The timber rattlesnake has a long history with the Navy. It is believed to be the snake depicted on the “Don’t Tread on Me” flag—the first flag of the colonial Navy. The timber rattlesnake was recently adopted as the mascot of the Naval Support Activity Hampton Roads—Northwest Annex and is featured on the base coin.

In 1995, declining numbers made this rattlesnake species the subject of a long-term ecological study

conducted by the Navy, ODU and VDGIF. The project is one of the longest running studies ever performed on the species (which can live up to 25 years in the wild) and provides critical information on the ecology and life history of this diminishing species. Naval Support Activity Hampton Roads—Northwest Annex located in Chesapeake, Virginia was the ideal study site for the survey project. Located in both the city of Chesapeake, Virginia and in Currituck County, North Carolina, the Northwest Annex covers approximately 2,500 acres of upland and wetland forests, emergent habitats, and agricultural fields. These are ideal habitats for the timber rattlesnakes.



Timber rattlesnake portrayed on the Northwest Annex coin.

Michael Wright



First flag of the Colonial Navy.

The Navy was interested in learning about the habitats on the installation that the rattlesnake occupied and how the mission of the installation could impact its survival.

The research team uses radio telemetry as the primary method to study the snakes. Radio telemetry allows the team to repeatedly locate the same snake in its natural environment with minimal disturbance. On average, the snakes are tracked once a week, but sometime as frequently as five days a week.

Originally, radio transmitters were surgically implanted into the snakes at ODU. The snakes were then returned to the Navy base where they were initially captured. However, in 2009, the primary researcher at ODU, Dr. Alan Savitzky, accepted a new position at Utah State University leaving no place to conduct transmitter implantations. The Navy came to the rescue and turned a room in the game check station at the Northwest Annex into a laboratory where radio transmitters could be surgically implanted into the snakes and where the snakes could recover after surgery.

Thus far, the study is responsible for the active radio telemetry monitoring of 55 timber rattlesnakes at the Navy installation and the collection of almost 15,000 snake observations. The investigation is revealing many of the life history attributes, movement patterns, and behavioral characteristics of the snakes leading to the discovery that the rattlesnake selects deciduous forests over pine forests; that, on average, males move twice as much as females; and that the snakes prefer to hibernate in rotting tree stumps. The study also uncovered that the snakes are ambush

predators and their primary prey item is the gray squirrel (*Sciurus carolinensis*). The most surprising results so far reveal the extensive yearly movements of the snakes which can be more than twelve miles and encompass an area of more than 700 acres.

The partnership among the research team began in 1995 when the Navy invited ODU and VDGIF to study the rattlesnake population on the Northwest Annex.

Timber rattlesnakes hunt squirrels by resting near fallen logs in an ambush posture.

Chris Petersen



Over seventy timber rattlesnakes have been found on the Northwest Annex since the start of the study.

Lindsay Eiser

DoD PARC Program Promotes Species & Habitat Management and Conservation

MEMBERS OF A Department of Defense (DoD) program are working hard to balance the Department's national security mission with the preservation of amphibian and reptile species and their habitats on nearly 29 million acres of military land.

Now led by Robert Lovich and Chris Petersen of the Naval Facilities Engineering Command, the Department of Defense Partners in Amphibian and Reptile Conservation (DoD PARC) program was originally formed in 2009 to provide leadership, guidance, and support for the conservation and management of amphibians and reptiles on military lands. An open-membership organization, the DoD PARC program is dedicated to sustaining the nation's mission readiness while managing, conserving, and studying amphibians and reptiles and their habitats, especially with respect to military operations and land management practices.

In support of military readiness, the DoD PARC program strives to sustain amphibian and reptile populations and their habitats through proactive management, conservation, stewardship, outreach, and partnerships. To achieve this mission, the program has established the following goals:

- Support the military mission by managing amphibians and reptiles.
- Reduce population declines of common and at-risk species, thus avoiding or minimizing the need to manage Endangered Species Act-listed species and designate critical habitats that could impact military missions.
- Provide strategies, tools, and information for amphibian and reptile protection, conservation, and consideration to be incorporated into existing natural resources and land management programs.
- Provide sound, science-based management and conservation guidelines, priorities, and objectives for reptiles and amphibians residing on DoD installations.
- Promote communication and coordination among national and local experts to achieve DoD mission and stewardship goals.
- Provide outreach tools to the military community, the general public, natural resources managers, and non-governmental organization partners to promote collaborative efforts and increase understanding of mission and conservation compatibility.

For more insights into the DoD PARC program, read our article entitled "DoD PARC Program Sustains Mission Readiness While Protecting Amphibians & Reptiles: Program Promotes Species & Habitat Management and Conservation" in the spring 2013 issue of *Currents*. To subscribe to the magazine or browse the *Currents* archives, visit the Department of the Navy's Energy, Environment and Climate Change web site at <http://greenfleet.dodlive.mil/currents-magazine>.



Natural Resource Specialist Chris Petersen captures a rattlesnake to replace its radiotransmitter.
Tammy Conkle



The Navy was interested in learning about the habitats on the installation that the rattlesnake occupied and how the mission of the installation could impact its survival. At that time and largely because of habitat loss, the snake was state-listed as an endangered species in Virginia. Very little

was known about the ecology of the snake and the VDGIF needed data to help prevent any further decline of the species in the state.

Chris Petersen of the Naval Facilities Engineering Command Atlantic and a graduate of ODU has worked on the rattlesnake project since its beginning.

His first job as a biologist was to radio track the rattlesnakes at the Northwest Annex.

"The partnership was, and remains, a beneficial relationship for all parties involved," says J. D Kleopfer, a herpetologist for the VDGIF. Students from ODU have the opportunity to

study the snakes to fulfill undergraduate and graduate requirements and gain practical field experience working on the project. The VDGIF can collect significant amounts of much need data on the habitat use and movement patterns of the snakes helping understand their ecology and preventing the further decline of the species in Virginia. The Navy gets site-specific data on this state-listed species directly supporting the mission at the Northwest Annex by helping to make predictions of the efforts of mission-related forest activities on the behavior of the snake, minimizing human-rattlesnake interactions, and educating base personnel on the ecological importance of the snake. Perhaps most importantly, nearly all of the data collected from the project are incorporated into Virginia's conservation plan for the rattlesnake which helps to prevent the species from declining any further in Virginia.

In an attempt to protect more land for the rattlesnake in southeastern Virginia and to build upon their partnership with the Navy, in 2007, the VDGIF purchased a 3,800-acre land parcel—the Cavalier Wildlife Management Area—to assist with the recovery of the snake. This property, adjacent to the Northwest Annex, benefits the snakes by providing even more protected habitat for the timber rattlesnake as well as other wildlife. The VDGIF purchase of the property also benefits the Navy by providing an encroachment buffer of natural habitat on the western side of the installation that is compatible with its military mission.

Partnerships have become a critical tool for the management and conservation of species on Department of



Radio transmitters are surgically implanted into the snakes at the Northwest Annex laboratory.

Chris Petersen



This anesthetized snake is ready to have a radiotransmitter surgically implanted into its body.

Chris Petersen

Defense lands. The timber rattlesnake project demonstrates the power of such a relationship and how groups can come together to work on a common goal, share costs, and leverage expertise. The Navy, ODU, and VDGIF formed a partnership more than eighteen years ago to work on a common goal—the collection of data on a declining species. Not only is each member of this partnership a winner—the rattlesnakes are also

coming out ahead in the deal. This relationship has provided critical data on the ecology of the timber rattlesnake greatly assisting in preventing any further decline of the species in Virginia and possibly many other states. [📍](#)

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NAS Jacksonville Heading for Zero Waste Discharge

Environmental Partnerships with City, State & Local Country Club Deliver Results

A PAIR OF projects at Naval Air Station (NAS) Jacksonville over the last 15 years have significantly reduced the effluent discharge from the base into the St. Johns River, and diverted the use of potable water for irrigation at the base and a neighboring golf course.

NAS Jacksonville is located on nearly four miles of the St. Johns River in Northeast Florida. The station has long been recognized for its productive relationship with the State of Florida and local environmental regulatory agencies and the Northeast Florida community, especially


regarding the mutual goal to improve the water quality of the river.

In 1992, NAS Jacksonville completed a four million dollar renovation of its wastewater treatment plant to produce effluent water that met state standards for high-level disinfection.



The NAS Jacksonville golf course is irrigated with a combination of captured stormwater and water reclaimed from the installation's wastewater treatment plant.

©Nan Sea (used with permission)



The reuse water is held in a retention pond before being pumped to the base golf course.

This renovation included removal of industrial wastes from entering the wastewater treatment plant, thereby creating a total domestic wastewater treatment facility. At the same time, the state was in discussion with area golf courses in an effort to get them to limit the use of groundwater for irrigation purposes. In 1994, the Timuquana Country Club, a private club on the northern border of NAS Jacksonville, entered into a discussion with the commanding officer of NAS Jacksonville regarding using the station's highly treated wastewater to irrigate the club's private golf course. Representatives of the Timuquana Country Club and NAS Jacksonville saw the opportunity to develop a tremendous environmental partnership that would benefit the river, groundwater, and the long term operations of the golf course. In 1998, the station and club signed an agreement for the club to connect to the station's dechlorination



system and divert approximately 200,000 gallons a day to irrigate its golf course. The country club paid all costs for the design, permitting and construction of the reuse pipeline and retention pond, in exchange for receiving the water at no cost.

This partnership prevents 10,000 pounds of nutrients per year from being discharged to the St. Johns River, as well as 73 million gallons of potable water per year from being removed from the Floridan Aquifer. It has also saved the club over \$200,000 compared to the cost of purchasing water from the local utility. According to Chris Neff, golf course superintendent for the Timuquana Country Club, the use of effluent reuse water has also resulted in a 25 percent reduction in fertilizer use. Neff comments, "We have an excellent relationship with NAS Jacksonville personnel on coordination of supply issues and maintenance requirements at the wastewater treatment plant."

Under the Clean Water Act, states are required to develop lists of impaired waters, or waters that fall below a state's own water quality standards. For each impaired body of water, the law requires that a state establish priority rankings and develop Total Maximum Daily Load (TMDL) calculations for these waters. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can

The Basics About the St. Johns River

THE ST. JOHNS River is Florida's longest river and its primary commercial and recreational river, running 310 miles from the marshes of the Indian River to the Atlantic Ocean east of Jacksonville. It's distinctive in that it is one of the few rivers in the United States that flows south to north. The river's width varies from unnavigable at its source to more than two miles wide. The total drop of the river is less than 30 feet, or about one inch per mile, making it one of the "laziest" rivers in the world. Because of this low flow, the St. Johns River is particularly susceptible to pollution.



Wood Storks are one of the endangered species that continue to thrive on and around the NAS Jacksonville golf course.

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For More Information

FOR MORE INSIGHTS into the Navy's sustainability efforts, read our article entitled "Proven Sustainability Approaches Advance Mission at Navy Installations: Efforts Include Energy & Water Conservation, Green Building Management Practices" in the winter 2014 issue of *Currents*. To subscribe to the magazine or browse the *Currents* archives, visit the Department of the Navy's Energy, Environment and Climate Change web site at <http://greenfleet.dodlive.mil/currents-magazine>.



receive and still meet water quality standards. In 2002 the state, Navy and municipalities on the lower St. Johns River basin formed a committee to establish the TMDL for their portion of the river. Based on the committee's discussions, the state issued permits to the Navy and municipalities in 2004 with allocations on reductions of total nitrogen discharge to the river by 2015. NAS Jacksonville decided that rather than spend over eight million dollars upgrading its wastewater treatment plant to meet the reduced nutrient discharge requirement, it would spend approximately four million dollars expanding the wastewater reuse system to its own golf course and spray fields in the southern area of the station. In 2007, based on an application written by NAS Jacksonville, the City of Jacksonville obtained a \$175,000 grant from the state to design the expansion. In 2010 NAS Jacksonville obtained a \$1.8 million Navy energy conservation grant to construct a portion of the expansion. The City of Jacksonville received a matching \$1.8 million grant from the state to construct the remainder.

"The nutrient loading to the St. Johns River has been reduced because of the strong partnership between the Department, the City of Jacksonville and the Naval Air Station," states Florida Department of Environmental Protection Secretary Herschel T. Vinyard Jr. "By committing to minimizing wastewater discharge and maximizing reuse, we are ensuring that the residents of Jacksonville have access to a clean, healthy St. Johns River."

In 2012, the station completed its portion of the project with a two-mile direct bore purple pipe to a 10-acre reuse





A juvenile bald eagle in its nest
on the NAS Jacksonville golf course.

Christine Bauer

pond next to the golf course. (Purple is the universal color for non-potable water in the state of Florida.) In 2013, the city completed connection of the pond to the station golf course, resulting in reduction of 18,000 pounds of nutrients per year discharged to the river and 37 million gallons of potable water per year removed from the Floridan Aquifer. The wooded areas of the golf course are home to dozens of bird and mammal species, including such threatened and endangered species as the Wood Stork, American Alligator and Sherman's Fox Squirrel.

"The health of the St. Johns River is vital to Jacksonville's economy and quality of life," said Jacksonville Mayor Alvin

Brown. "We appreciate the Navy's partnership and commitment to improve water quality through its wastewater reuse project. It helps make our community an even more attractive place for people to live, work and visit."

When the city completes a two-mile expansion of the purple pipe to spray fields in the southern area of the station in late 2014, not only will over 54,000 pounds of nutrients a year will be diverted from the river, this important part of the base will also be nourished and enhanced.

When complete, the station will become the first major utility in Northeast Florida to reach zero discharge. This achievement is the direct result of a strong long-term commitment by the State of Florida, City of Jacksonville, Timuquana Country Club and NAS Jacksonville to work closely together to meet a common goal and is an example for other military installations, states and communities to follow. [↱](#)

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The pumping station at the NAS Jacksonville
wastewater treatment plant.

NAVSEA Warfare Centers Complete Energy Analysis for Marine Corps

Analysis of Alternatives Provide Options to Reduce Power Consumption in the Field

THE NAVAL SURFACE Warfare Centers completed an Analysis of Alternatives (AoA) report on the Mobile Electric Hybrid Power Source (MEHPS) for the Marine Corps Systems Command (MCSC) which provides an analysis of the options available that could reduce U.S. Marine Corps power consumption in the field, ultimately saving lives by reducing the need for fuel delivery convoys.

“The MCSC is moving forward with the MEHPS program, collaborating with the Army,” said Jen Gibson, senior program analyst on the Advance Power Team for the Marine Corps Systems Command. “The analysis provided in the AoA was used to draft a Capabilities Development Document that will be staffed through both services. The end product will provide the operating forces with more efficient power generation and storage.”

The analysis was performed to specifically address gaps, such as the present lack of existing capabilities that automatically match loads to expeditionary energy demands, as well as provide options for harvesting energy from renewable or waste sources to power command and control and life support systems.

The analysis evaluated the current state of hybrid power technology in the commercial sector, defining requirements unique to the Marine Corps, defining, analyzing and comparing a diverse set of alternatives, and providing cost and risk assessments of those technologies.

The evaluation included potential commercial or government off-the-shelf solutions, as well as those

still in development, including generators, renewable energy sources, energy storage modules, converters and power electronics.

A team of experts from Naval Surface Warfare Center (NSWC) Panama City, NSWC Crane, NSWC Carderock, MCSC and the Expeditionary Energy Office conducted the analysis.

“This AoA assists the Marine Corps in developing a detailed and cost-effective way ahead for integrating existing programs with new solutions in support of the overarching Marine Air Ground Task Force (MAGTF) concept of employment,” said NSWC Panama City AoA project lead Steve Gorin.



NSWC PCD is home to the Expeditionary Energy and Integration Team's (E3I) test compound where shelters are tested to understand how tents used in theater absorb and retain heat. The E3I's team then researches, develops, tests and evaluates possible energy alternatives for service members.

Jacqui Barker

Expeditionary Energy Team Earns USMC Excellence in Engineering MAGTF Award

THREE NAVSEA WARFARE Centers earned U.S. Marine Corps (USMC) collaborative engineering accolades. The team was among 20 other Department of Defense (DoD) personnel recognized by MCSC. NSWC PCD's team collaborated with MSCS, Program Executive Officer Land Systems, Naval Surface Warfare Centers Carderock, Crane, and Panama City Divisions, and Marine Corps Headquarters on energy reducing initiatives.

The team specifically was recognized for having identified innovative, tactical level, renewable energy systems that not only meet the Marine Corps' specified requirements, but their efforts took the requirements one step farther—to the field.

"The great thing about this award is that it was achieved through the collective efforts of a Navy-Marine Corps team," said Brig. Gen. Frank Kelley, MCSC commanding officer. "They took the commandant's words to heart and went to work finding ways to reduce our energy dependence in Afghanistan and across our operating forces. Their efforts have already resulted in improved energy efficiency and set us on a path to meet both the commandant and secretary of the Navy's expeditionary energy goals."

In fact, the team's efforts resulted in eight percent more operational reach through energy savings than it did in 2011 which may not seem like a lot now, but over time and with more research and development more savings may be realized. The efforts has now led other services to rapidly combine effective solar panels, rechargeable batteries and power management controllers into effective hybrid renewable systems, fielded at the tactical level. Reducing the overall energy consumption at the small unit level by 22 percent, these systems reduced the battery weight of a three day patrol by 35 percent, and size/weight/fuel consumption of the Platoon/Company's Forward Operating Base generators.

The award nomination cited the team having "supported innovative tactical level renewable energy systems, energy efficient generators, and low power lighting systems, optimized power distribution systems, tactical level insulated shelters, and energy optimized command posts."

While expeditionary energy is still somewhat uncharted territory within the DoD, the pioneering joint team started first with recent DoD, Department of the Navy, and USMC energy orders, policies, guidance and more than 90 active programs, 17 Future Naval Capabilities


and science and technology efforts and more than 30 relevant technologies in order to quantify the goals, returns on investments, energy aspect design concepts, and expected test and evaluation energy criterion—a monumental amount of content analysis to propose the path ahead.



Matt McBride, former Combat Support Systems, Assistant Program Manager and E3I team member, accepted the MCSC 2012 Commander's Excellence in MAGTF Engineering Award during an award ceremony held at Quantico, VA.

In addition to analyzing system capabilities, the warfare center team, in conjunction with MCSC Cost and Analysis Branch, evaluated potential system costs. This review eliminated systems that were not the most affordable systems relative to their effectiveness.

"In the end, the AoA identified the potential for hybrid or micro-grid technologies to close gaps that current systems cannot close," said Gorin. "The best alternatives were able to save significant amounts of fuel and extend the life of generators with little additional burden."

The Naval Surface Warfare Centers are field activities of the Naval Sea Systems Command (NAVSEA), and are Navy's principal research, development, test and evaluation activities for surface ship and subsystems. 

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NAVFAC Northwest Converts Unused Navy Brig Into Productive Office Space

New Space is Now U.S. Coast Guard Command Facility

THE WORK WEEK might feel like a prison sentence for some. But for U.S. Coast Guard personnel stationed at Naval Base Kitsap Bangor, WA who helped transform the former Navy brig into a fully reusable functional command center, the work week is likened to being out of prison.

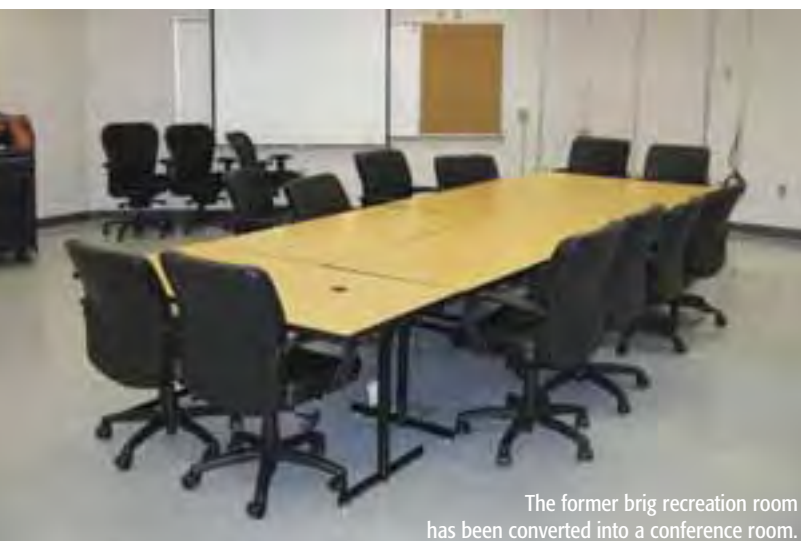
“The renovation of the former brig was a team effort of U.S. Coast Guard, Strategic Weapons Facility Pacific, contractors and base public works personnel. This is now a great command facility for the U.S. Coast Guard Maritime Force Protection Unit (MFPU) to work and it definitely beats the temporary trailers,” said Cmdr. Tom Sullivan, commanding officer of the U.S. Coast Guard’s MFPU Bangor.

Naval Facilities Engineering Command (NAVFAC) Northwest recently completed the project in which an unused Navy brig was converted into office space for approximately 150 personnel assigned to the MFPU Bangor. The unit works jointly with the U.S. Navy to protect Navy vessels at Bangor. The newly renovated building provides a permanent home for the unit which had been working in a leased office trailer.

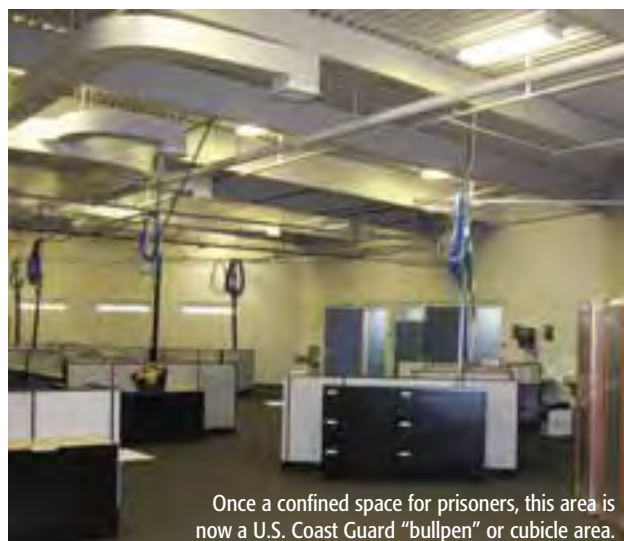
The former brig had been vacant since the summer of 2012 when the last Navy prisoners were transferred to Joint Base Lewis-McChord. Consolidating brig requirements with other Department of Defense services is a cost saving measure as it reduces the need for military guards for a small number of prisoners, gives the unused brig a new life and saves the Navy money with the return of the leased office trailer.

The newly renovated building provides a permanent home for the unit which had been working in a leased office trailer.

It was timely that the Navy had a new home for the U.S. Coast Guard. Work began in early fall of 2012 and was completed in late fall of 2013 at a cost of \$1.26 million. NAVFAC Northwest recycled the vacated brig with a very distinct use and unique construction into a more hospitable setting. As one might understand, a brig is a prison which had 15 prison cells, two open living bays, above average security systems, and very high fences topped with concertina wire. Following some demolition and building repairs new requirements included running thousands of feet of cable for telecommunications into two former prisoner bays now converted to 65 “bullpens” or cubicles.



The former brig recreation room has been converted into a conference room.



Once a confined space for prisoners, this area is now a U.S. Coast Guard “bullpen” or cubicle area.



A significant challenge in the schedule included meeting the expiring contract of the leased trailer, but the contractor was able to complete the core task of the project eight weeks early. This allowed for a phased furniture move-in, phone/data installations, and enabled the MFPU to vacate their trailers while continuing to

fully support their mission and maintain qualifications and training.

The efforts of the contractor as well as the NAVFAC Northwest team were recognized at the ribbon cutting ceremony for the newly converted building attended by Rear Adm. Richard Gromlich, U.S. Coast Guard District 13 Commander. At the ceremony Capt. Baretela, commanding officer of Strategic Weapons Facility Pacific thanked Mr. Roger Newton of Newton Building and Development LLC with a letter of appreciation. Capt. Chris LaPlatney, commanding officer of NAVFAC Northwest, thanked the members of the NAVFAC Northwest team individually with his personal command challenge coins. ⚓

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Be Part of the Navy's Best Magazine • Submit Your Story by July 18

Have some good news about your energy or environmental program? Want to share it with others? *Currents* is the place to do it. *Currents*, the Navy's official energy and environmental magazine, has won first place in the Navy's Chief of Information Merit awards competition three times. And it's people like you and the stories you submit that make *Currents* the best magazine in the Navy.

Your experiences take on new meaning when you share them with *Currents* readers and on Facebook.

So if you have a story that you'd like us to promote in our fall 2014 issue, submit your text and images by Friday, July 18, 2014. Any submissions received after this date will be considered for our winter 2015 issue.

You can get a copy of the *Currents* article template by sending an email to Bruce McCaffrey, our Managing Editor, at brucemccaffrey@sbcglobal.net. This template has proven to be a tremendous asset in helping us edit and track your article submissions. And don't worry. If writing isn't one of your strengths, we'll handle all of the editing necessary to get your submission into publishable form.

Bruce is also available at 773-376-6200 if you have any questions or would like to discuss your story ideas.

As a reminder, your Public Affairs Officer must approve your article before we can consider it for inclusion in the magazine.

Don't forget to "like" us on Facebook at www.facebook.com/navycurrents. *Currents'* Facebook page helps expand the reach of the magazine and spread the news about all the great work you're doing as the Navy's energy and environmental guardians. And your experiences take on new meaning when you share them with *Currents* readers and on Facebook.

Currents Deadlines

Fall 2014 Issue: Friday, July 18, 2014
Winter 2015 Issue: Friday, October 17, 2014
Spring 2015 Issue: Friday, January 16, 2015
Summer 2015 Issue: Friday, April 17, 2015

You can also refer to your *Currents* calendar for reminders about these deadlines.



Navy Announces Fiscal Year 2013 CNO Environmental Award Winners

Annual Awards Recognize Outstanding Environmental Stewardship

VICE ADMIRAL PHIL CULLOM, deputy chief of naval operations for fleet readiness and logistics (N4), announced the winners of the fiscal year (FY) 2013 Chief of Naval Operations (CNO) Environmental Awards competition on March 18, 2014.

Each year, the CNO Environmental Awards honor ships, installations, individuals, and teams for their outstanding achievements in Navy environmental programs. The FY 2013 winners, listed alphabetically within each category, are provided below.

Natural Resources Conservation, Small Installation

- Naval Base Point Loma, California
- Pacific Missile Range Facility, Hawaii

Natural Resources Conservation, Individual or Team

- Gary Cottle and Anna Keyzers of Naval Air Station Fallon, Nevada
- Michael Farrell Wright of Naval Air Station Oceana, Virginia
- Naval Support Activity Monterey Natural Resources Conservation Team, California

Environmental Quality, Non-Industrial Installation

- Commander, Fleet Activities Yokosuka, Japan
- Joint Expeditionary Base Little Creek-Fort Story, Virginia
- Navy Region Center Singapore

Environmental Quality, Individual or Team

- Dr. Awni M. Almasri of Naval Support Activity Bahrain
- Fleet Logistics Center Pearl Harbor Environmental Quality Team, Hawaii
- Naval Base Ventura County, California

Environmental Quality, Large Ship

- USS Frank Cable (AS 40)
- USS Nimitz (CVN 68)
- USS Ronald Reagan (CVN 76)

Sustainability, Industrial Installation

- Naval Base Ventura County, Point Mugu, California

- Naval Weapons Station Seal Beach, California
- Portsmouth Naval Shipyard, Maine

Environmental Restoration, Installation

- Former Naval Air Station Moffett Field, California
- Hunters Point Naval Shipyard, California
- Naval Air Station Meridian, Mississippi

Environmental Restoration, Individual or Team

- Joint Expeditionary Base Little Creek-Fort Story, Virginia
- Naval Air Station Cecil Field Base Realignment and Closure Cleanup Team, Florida
- Naval Air Station Jacksonville Environmental Restoration Partnering Team, Florida

Cultural Resources Management, Installation

- Commander, Fleet Activities Yokosuka, Japan
- Joint Base Pearl Harbor-Hickam, Hawaii


Environmental Excellence in Weapon System Acquisition, Large Program, Individual or Team

- F/A-18E/F & EA-18G Program Office, PMA-265 Green Hornet Team, Patuxent River, Maryland
- PMA-290 P-8A Poseidon Environment, Safety, and Occupational Health Team, Patuxent River, Maryland

In a naval message announcing the winners, Cullom saluted the awardees.

"Congratulations to the fiscal year 2013 CNO Environmental Award winners and to all who participated in noteworthy efforts promoting environmental stewardship," Cullom said. "I applaud all of the nominees for your exceptional dedication to protecting the environment and preserving resources in support of our Navy mission."

All CNO winners advance to the Secretary of the Navy level of competition.

For more information on the CNO Environmental Awards program, visit <http://greenfleet.dodlive.mil/environment/awards>. 

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ONE OF MY Best Shots



I captured this image of an Eastern Red-spotted Newt (*Notophthalmus viridescens*) at Fort AP-Hill, Virginia during a transcontinental sampling effort to study *Batrachochytrium dendrobatidis* (Bd) occurrence in amphibians on Department of Defense installations.

I used a Nikon D70. Focal length 105mm, aperture f/4.0, exposure 1/60.

Paul Block ● Ecologist ● Naval Facilities Engineering Command Atlantic ● paul.block@navy.mil

Submit your own Best Shot to Bruce McCaffrey, *Currents'* managing editor, at brucemccaffrey@sbcglobal.net.

SERDP & ESTCP Announce 2013 Projects of the Year

Efforts Help to Enhance DoD Mission Capabilities While Improving Environmental Performance

THE STRATEGIC ENVIRONMENTAL Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP) have selected six Projects of the Year in recognition of outstanding research and technology developments that will benefit the Department of Defense (DoD). These efforts are helping DoD enhance its mission capabilities, improve its environmental performance, and reduce costs. Recipients of this prestigious honor and descriptions of their award-winning projects follow.



Munitions Response

SERDP Project of the Year

Acoustic Response of Underwater Munitions Near a Sediment Interface: Measurement-Model Comparisons and Classification Schemes

Dr. Steven G. Kargl,
University of Washington

In an important milestone, scientists have shown that low-frequency sonar can be an effective method for detecting and classifying underwater munitions in a real-world, open water setting. In work funded by SERDP, Dr. Steven Kargl of the University of Washington collaborated with a half dozen research



In an important milestone, SERDP research shows that low-frequency sonar successfully detects and classifies munitions in a field setting, the Gulf of Mexico.

The high-quality data set collected through this project shows that low-frequency sonar can be effective in detecting and classifying underwater munitions in real-world conditions.

teams in conducting a complex, coordinated experiment in the Gulf of Mexico.

In prior laboratory experiments and carefully controlled tests in ponds, low-frequency sonar has shown promise as a method to detect and classify underwater munitions. Determining if this acoustic technique would work in an open water environment with multiple variables is the next step in assessing its viability for routine use.

In the SERDP project, conducted in the summer of 2013, teams set up a series of jigs in the Gulf, placed various objects, including munitions, on the sandy bottom and among the rocks on the sea floor, then used sonar to detect and classify the items. Along the way, the research teams encountered a number of real-world interferences including fish using the jigs as artificial reefs that had to be overcome.

The high-quality data set collected through this project shows that low-frequency sonar can be effective in detecting and classifying underwater munitions in real-world conditions. The development of a sonar-based survey system would provide DoD with an efficient means of collecting accurate information about the location and identity of underwater munitions to support management or cleanup.

ESTCP Project of the Year

Compressor Airfoil Protective Coatings for Turbine Engine Fuel Efficiency

Mr. Gregory Kilchenstein,
Office of the Secretary of Defense,
Logistics and Materiel Readiness

An innovative new protective coating for jet engine compressor blades, demonstrated in an ESTCP-funded study, could save DoD tens of millions

of dollars by extending the life of the engines and improving fuel efficiency, and at the same time reducing carbon emissions.

Jet engines are used in thousands of military aircraft and tanks. A key component of these engines is an axial compressor, made up of several rows of airfoils, which are wing-shaped pieces of metal. During the operation of the aircraft and tank engines, these airfoils constantly spin at rapid speeds, and air and particulates, such as sand, pass through them. Over time, the surfaces of these airfoils wear down and decrease the efficiency of the engine, requiring more fuel to be used to achieve the same performance. The airfoils, which must operate in extremely high temperatures, are made of high-performance metals and are very expensive to replace.



This ESTCP project demonstrates that innovative erosion-corrosion resistant coatings extend the life of jet engines and improve fuel efficiency by as much as five percent, while also reducing carbon emissions. Pictured here is Matt Juarez, one of the project team members from StandardAero Inc.

An innovative new protective coating for jet engine compressor blades could save DoD tens of millions of dollars by extending the life of the engines and improving fuel efficiency, and at the same time reducing carbon emissions.

In the ESTCP study, Mr. Greg Kilchenstein of the Office of the Secretary of Defense, Logistics and Materiel Readiness, and his multi-Service team demonstrated that applying a thin erosion-corrosion resistant coating can extend the life of the airfoils and improve fuel efficiency. The coating is a multilayer ceramic-metallic matrix applied in a vacuum using a cathodic arc physical vapor deposition process. The study found that the coating can improve fuel efficiency by as much as five percent, which could result in substantial savings in fuel costs, as well as reducing carbon emissions. The study also demonstrated these innovative coatings can extend the life of the airfoils, leading to further cost savings by reducing repairs and

extending the life of the aircraft and tank engines.

Resource Conservation and Climate Change

SERDP Project of the Year

Development and Use of Genetic Methods for Assessing Aquatic Environmental Condition and Recruitment Dynamics of Native Stream Fishes on Pacific Islands

Dr. Michael J. Blum, Tulane University

An extensive study of the life history and genetics of at-risk fish species may help ensure the U.S. military can continue to operate its multiple installations throughout Hawaii and other Pacific Islands sustainably for decades to come. Training troops and testing

weapon systems at these installations is essential to DoD's mission. At the same time, the Department has an obligation to conduct its activities in ways that do not harm the environment or prevent continued military use. In recent years, DoD has taken a holistic approach, exploring how to improve its land use and natural resource management within ecosystem and watershed contexts that extend beyond the installation boundary.

To that end, a SERDP-funded project led by Dr. Michael Blum of Tulane University tracked the life history and genetic attributes of two at-risk native fish species in the Hawaiian Islands. Over the course of their lifecycle, these fish start out in fresh water, move to the near-shore marine envi-

SERDP research finds at-risk fish populations can serve as a key indicator for assessing Pacific Island watershed health and sustaining military operations in this important region.



An extensive study of the life history and genetics of at-risk fish species may help ensure the U.S. military can continue to operate its multiple installations throughout Hawaii and other Pacific Islands sustainably for decades to come.

ronment, then migrate out to sea and eventually return to fresh water. Because these species spend periods of their lives throughout the linked watershed-marine environment, studying these fish can serve as a surrogate for studying the health of the Islands' complex ecological systems. At all points along the way, the condition of the ecological system must be healthy and connected for the species to survive and thrive.

Using genetic assessment protocols, researchers identified potential watershed impacts from multiple sources, including land use associated with the military, urbanization, and agriculture. However, the presence of non-native fish also had a prominent impact on native fish

species' population viability. The study results reinforce the need for DoD natural resource managers to continue taking steps to monitor and protect resources within a watershed context, through management practices such as avoiding excessive sediment and nutrient loadings to streams, as well as working with other land managers to take a holistic approach to protecting the complex ecological systems of Hawaii and other Pacific Islands.

Environmental Restoration

SERDP Project of the Year

Coupled Diffusion and Reaction Processes in Rock Matrices: Impact on Dilute Groundwater Plumes

Dr. Charles E. Schaefer, Jr., CB&I

One of DoD's most challenging environmental restoration issues is determining how to deal with contaminants that have seeped into the fractures in bedrock and are a continuing source of groundwater contamination. A recent SERDP-funded research project found that studying the fundamental features of the bedrock itself may hold a key to addressing this challenge.

Dr. Charles Schaefer of CB&I and his team measured and evaluated the ways in which the mineralogy of the bedrock can affect how chemicals are stored and how long it takes for those contaminants to break down through natural attenuation. For this project, the researchers focused on trichloroethene (TCE), a toxic cleaning solvent used for much of the twentieth



SERDP research finds that ferrous iron mineralogy can significantly increase TCE natural attenuation rates at fractured bedrock sites.

The study found that the mineralogy of the bedrock can have a significant effect on the rate of natural attenuation of trichloroethene.

century by the military and private industry. TCE is one of the most widely dispersed contaminants in the United States, and it is found on nearly all military installations in the country. On those installations that are known to have fractured bedrock, TCE migrates through conductive fractures, and also into the rock itself. For these sites, it is extremely difficult and, in many cases cost-prohibitive, to locate the contaminant source and remove it.

The study found that the mineralogy of the bedrock can have a significant effect on the rate of natural attenuation of TCE. For example, the presence of ferrous iron minerals within

the rock, which is common in many types of bedrock, can hasten the rate of TCE dechlorination. While it was long believed that natural attenuation of TCE in bedrock would take hundreds of years, the results of this study suggest that in fact it could occur within our lifetime.

The data from this study can be used to better predict rates of TCE dechlorination at bedrock sites on military installations, providing DoD with an essential tool to guide decisions on how best to treat contaminated sites. At sites where acceptable rates of monitored natural attenuation (MNA) can be demonstrated, more aggressive and expensive treatment can be avoided.

ESTCP Project of the Year

Demonstration and Testing of ClimaStat® for Improved DX Air-Conditioning Efficiency

Dr. Michael West and Dr. Richard Combes, Advantek Consulting

As the manager of 300,000 buildings on hundreds of military installations with an annual facility energy cost of more than \$4 billion, DoD is actively seeking ways to reduce its energy costs through its Installation Energy Test Bed initiative. A recent ESTCP-funded study demonstrated a low-cost innovative technology that could provide significant cost savings by improving energy efficiency in roof- or ground-mounted heating and air



Innovative ClimaStat technology improves energy efficiency by 29 percent for an HVAC retrofit at Marine Corps Air Station Beaufort and 17 percent for a new system at Cape Canaveral Air Force Station as part of an ESTCP demonstration.

conditioning systems used for small buildings of less than 100,000 square feet. Tens of thousands of these buildings exist on military installations throughout the United States.

In the ESTCP demonstration, Dr. Michael West and Dr. Richard Combes of Advantek Consulting installed the new ClimaStat technology in heating, ventilation, and air conditioning (HVAC) systems at two installations. ClimaStat is a refrigeration-science technology consisting of small devices with multiple sensors that helps regulate the pressure changes across an HVAC system. ClimaStat can be field-retrofitted into existing HVAC equipment or installed in new

lithium alloys. Beryllium is particularly useful for this purpose because it is both lightweight and strong, a rare combination not found in most other metals. Bushings, small round metal components used in helicopter rotors, for example, must be lightweight, but also strong enough to withstand a demanding operating environment. The problem is beryllium is a toxic material that can be harmful to workers who handle it during assembly and repair. Working with beryllium, which requires donning protective gear and taking extensive precautions, is costly and time-consuming.

This study demonstrated a low-cost innovative technology that could provide significant cost savings by improving energy efficiency in roof- or ground-mounted heating and air conditioning systems used for small buildings.

equipment. At Marine Corps Air Station Beaufort, South Carolina, the study demonstrated 29 percent efficiency improvements on the retrofit of an existing system. At Cape Canaveral Air Force Station, Patrick Air Force Base, Florida, the study demonstrated 17 percent savings on a brand new system. The payback periods for these two scenarios are four years and three years, respectively.

The ESTCP investment provided the Advantek team with a unique opportunity to take an idea they had demonstrated as a laboratory prototype and install it into a real-world commercial system. The team used more than 90 sensors in the demonstrations, providing a rigorous test of the technology's ability to improve energy efficiency. Both of the military installations that participated in the demonstration have plans to install additional ClimaStat devices. The demonstrations showed that there is great potential to use the technology to condition buildings on other DoD installations, as well as commercial buildings in the private sector.

Weapons Systems and Platforms

SERDP Project of the Year

Nanostructured Copper Alloys as an Alternative to Copper-Beryllium

Dr. Jonathan L. McCrea and Dr. Brandon Bouwhuis, Integran Technologies Inc.

For decades, certain essential parts in military fixed and rotary wing platforms have been made with copper-beryl-

A SERDP-funded project developed and validated a nanocrystalline copper electroplating process that produces an environmentally benign copper alloy that matches the desirable properties of copper-beryllium. This pulsed electroplating process, developed by Dr. Jonathan McCrea and Dr. Brandon Bouwhuis at Integran Technologies Inc., goes beyond merely coating a metal object. Rather, components that require little to no machining to achieve final dimensions are created by this pulsed-plating process, which alters the crystalline structure of the metal alloys as they are being formed. The study showed this innovative process also can be used successfully for large metal sheets and high conductivity wires, both of which are used in multiple military applications.

The development of these nanostructured copper alloys, which match the essential beryllium properties of being both lightweight and high-strength, without the toxicity, could result in substantial cost savings for DoD.

SERDP and ESTCP are DoD's environmental research programs, harnessing the latest science and technology to improve DoD's environmental performance, reduce costs, and enhance and sustain mission capabilities. SERDP and ESTCP respond to environmental technology requirements common to all of the military Services, complementing the Services' research programs. The programs promote partnerships and collaboration among academia, industry, the military Services, and other Federal agencies. Both manage investments in five program areas:

SERDP researchers developed an innovative plating process that produces nanostructured copper alloys that match beryllium's essential properties of being lightweight and high-strength, without the toxicity. Pictured here are plated bushings, small round metal components used in helicopter rotors.



This project developed and validated a nanocrystalline copper electroplating process that produces an environmentally benign copper alloy that matches the desirable properties of copper-beryllium.


1. Energy and Water
2. Environmental Restoration
3. Munitions Response
4. Resource Conservation and Climate Change
5. Weapons Systems and Platforms

SERDP and ESTCP are independent programs managed from a joint office to coordinate the full spectrum of efforts, from basic and applied research to field demonstration and validation.

SERDP is DoD's environmental science and technology program, planned and executed in partnership with the Department of Energy and the U.S. Environmental Protection Agency, with participation by numerous other Federal and non-Federal organizations. The program focuses on cross-service requirements and pursues solutions to the

Department's environmental challenges while enhancing and sustaining military readiness.

ESTCP is DoD's environmental technology demonstration and validation program. Projects conduct formal demonstrations at DoD facilities and sites in operational settings to document and validate improved performance and cost savings. Demonstration results are subject to rigorous technical reviews to ensure that the conclusions are accurate and well supported by data.

For more information, please visit www.serdp-estcp.org. 

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NAVSUP Updates the *Buy It Green* Guide

Sustainable Purchasing Guide Gets a New Companion Publication, the *Contract It Green* Guide

THE DEPARTMENT OF Defense (DoD) Strategic Sustainability Performance Plan (SSPP) has set a goal that 95 percent of all procurements and contracts incorporate sustainable products and services. To help meet that goal, Naval Supply System Command, Weapon Systems Support (NAVSUP WSS) has released the second edition of *Buy It Green*, a guide to sustainable procurement, and its new companion booklet, *Contract It Green*, to assist in sustainable contracting.

variety of areas, including sustainable acquisition and contracting. To address the procurement aspect and to consolidate the Executive Order's goals, the DoD's SSPP was developed. The SSPP acknowledges DoD's profound impact on everything from energy and water consumption to the use of hazardous materials, to the amount of solid waste generated. Specifically, this plan recognizes the importance of procurement and contract decisions.

2012. This year, a new edition of the *Buy It Green* guide has been produced, with updated product listings and educational articles. The *Buy It Green* guide is a compilation of products that are classified as sustainable by the Defense Logistics Agency (DLA) and/or the General Services Administration (GSA). These products all possess sustainable attributes such as biobased ingredients, plastic-free packaging, low Volatile Organic Compounds, or other environmentally friendly factors.

The SSPP acknowledges DoD's profound impact on everything from energy and water consumption to the use of hazardous materials, to the amount of solid waste generated.

What does sustainability really mean to the DoD? Executive Order 13514, "Federal Leadership in Environmental, Energy and Economic Performance," states that to make an item or process "sustainable" is "to create and maintain conditions, under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations of Americans." Executive Order 13514 issued specific goals in a

Sustainable procurement is nothing new in the Navy. But the push for sustainable procurement accelerated with the issuance of the SSPP in 2010, and its directive that 95 percent of all procurements and contracts should be conducted sustainably.

The *Buy It Green* Guide

To help meet this goal of 95 percent sustainable procurement, NAVSUP WSS developed the first *Buy It Green* guide in

To create the *Buy It Green* guide, NAVSUP WSS compiled lists of the Navy's highest demand items from both GSA and DLA. These were diverse lists, with products ranging from paper towels to air conditioners. Not everything on these lists was sustainable. For products that were not classified as sustainable by GSA or DLA, environmentally friendly substitutes were found.

CONTINUED ON PAGE 74.

How to
Buy Green
for a
Sustainable
Navy

BUY IT GREEN 2014



How to Use the *Buy It Green* Guide

IMAGINE YOU ARE searching for disposable forks. Open the *Buy It Green* guide and look in the “Products for the Galley” section.



Individual Thermoses

Lightweight, picnic-quality thermos is made of 50 percent wheat-based resin (biobased) and 50 percent polypropylene. This thermos is heat-tolerant, environmentally friendly and biodegradable. Meets FDA requirements. Wheat. Direct delivery.

7345-01-004-1881	402	\$7.85	DLA
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Individual Forks

Lightweight, picnic-quality fork is made of 50 percent wheat-based resin (biobased) and 50 percent polypropylene. This fork is heat-tolerant, environmentally friendly and biodegradable. Meets FDA requirements. Wheat. Direct delivery.

7345-01-004-1881	402	\$7.85	DLA
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Individual Knives, Shipped

Lightweight, picnic-quality knife is made of 50 percent wheat-based resin (biobased) and 50 percent polypropylene. These individually wrapped knives are heat-tolerant, environmentally friendly and biodegradable. Meets FDA requirements. Wheat. Direct delivery.

7345-01-004-1881	7000	\$88.84	DLA
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Individual Knives, Shipped

Lightweight, picnic-quality knife is made of 50 percent wheat-based resin (biobased) and 50 percent polypropylene. These individually wrapped knives are heat-tolerant, environmentally friendly and biodegradable. Meets FDA requirements. Wheat. Direct delivery.

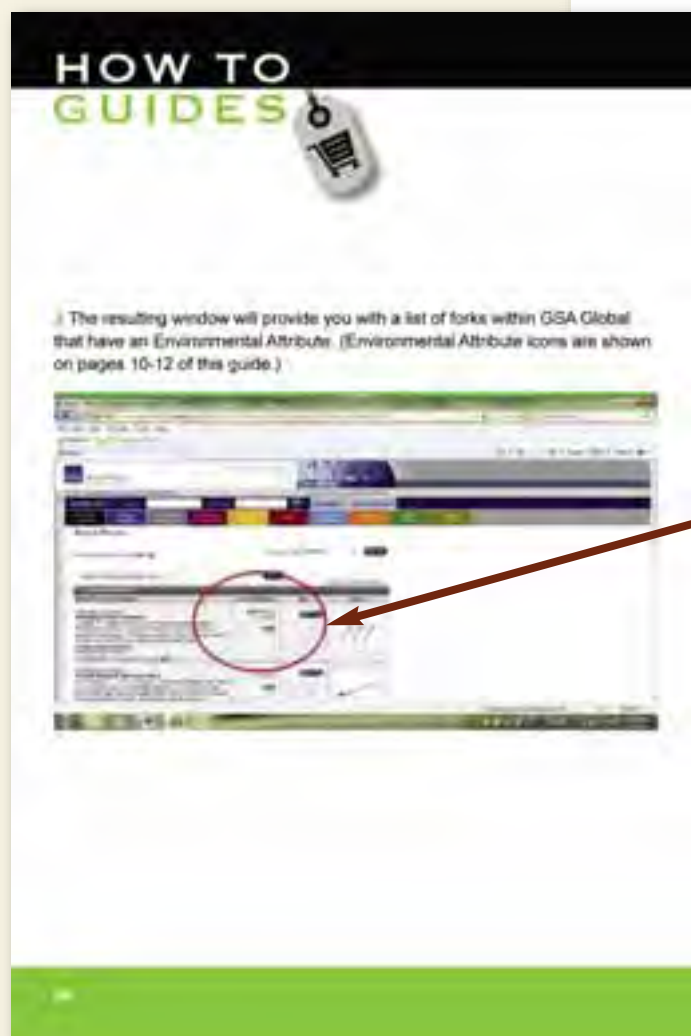
7345-01-004-1881	5000	\$88.84	DLA
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In this instance, you'll find multiple sustainable items to choose from. Select the NSN for the disposable fork that interests you.

You'll note that this item has both GSA and DLA logos, meaning it is available from both web sites. The *Buy It Green* guide walks you through the process of purchasing your item from either GSA Global, GSA Advantage, or DoD EMALL.

If you choose to shop on GSA Global, simply go to www.gsaglobalsupply.gsa.gov and enter your User ID and password if you have one. You can browse without entering a User ID and password, but you will need to log in to complete your order.

Enter the NSN for the product you have chosen under "Search" in the upper left-hand corner.



The next screen will contain full ordering information for this item.

The *Buy It Green* guide provides instructions on how to shop for any green item on the GSA or DLA web sites with or without entering a NSN. You will be able to find the sustainable products you need whether they are listed in the guide or not.

How to
Contract
Green for a
Sustainable
Navy

CONTRACT IT GREEN 2014



Using the *Contract It Green* Guide

EARLY IN THE acquisition planning process, it's important to identify ways to integrate sustainability into your contracts. This can be accomplished by incorporating the right Federal Acquisition Regulation (FAR) clauses and Statement of Work (SOW) language.

Types of Contracts with Green Opportunities

One of the main thrusts of the Executive Orders with respect to integration of green purchasing into contracts is **applicability**. E.O. 13514 states that 95 percent of all new **applicable** contracts, including non-exempt contract modifications, require products and services that are energy-efficient, water-efficient, biobased, environmentally preferable, non-toxic-declaring, contain recycled content, or are non-toxic or less-toxic alternatives. "**Applicable**" means that one or more of the designated products will be supplied or used in the performance of the contract or contract action. The purchase of medical supplies, for example, is not applicable because there are no green requirements for medical supplies at this time.

It's important to identify ways to integrate "Green" into contracts early in the planning process to incorporate the right FAR clauses and SOW language. Typical questions to explore are:

- Does the procurement require the use of green products?
- Does the procurement require the use of paper deliverables?
- Can the procurement be modified to include the use of green products?
- Does the procurement include green language in the statement of work?

Generally, the following types of contracts utilize applicable green products:

- Cafeteria and food services
- Electronic equipment leasing
- Fleet maintenance
- Janitorial services
- Landscaping services
- Laundry services
- Meeting and conference services
- Post-management

Example SOW Language:

All applicable equipment procured by the contractor herein shall meet the requirements of Biobased, Water-Saving, Comprehensive Environmental Guidelines, Design for the Environment and Energy Star Programs.

The contractor shall to the maximum extent possible make use of items containing biobased materials in the performance of this contract.

Landscaping Services

Applicable FAR Clauses:

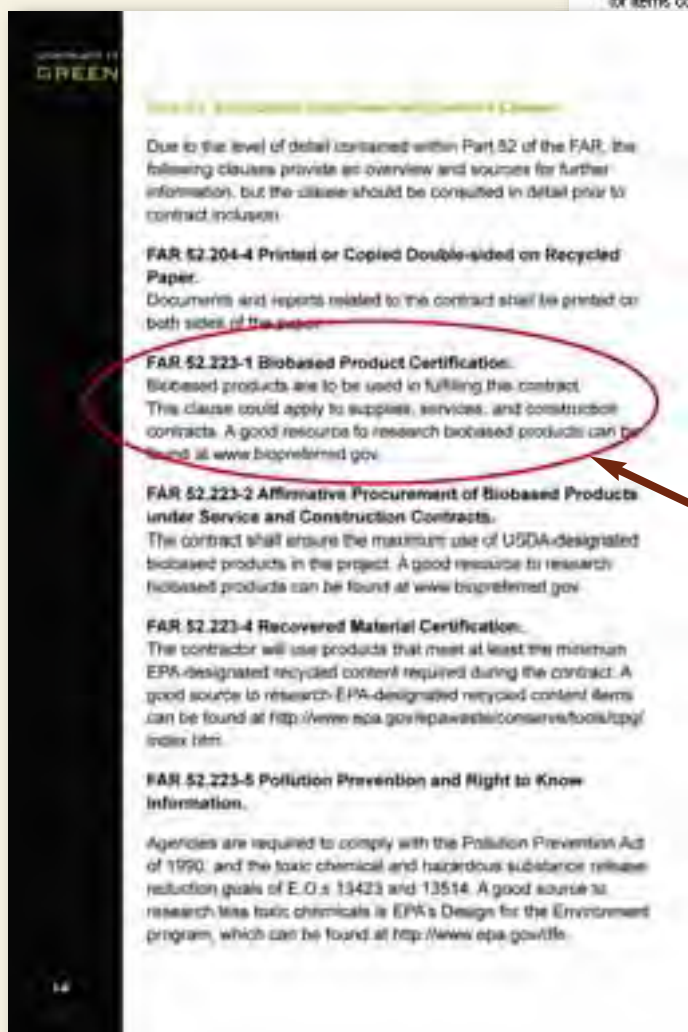
- 52.223-1 Biobased Product Certification
- 52.223-2 Alternative Procurement of Biobased Products under Service and Construction Contracts
- 52.223-4 Recovered Material Certification
- 52.223-8 Pollution Prevention and Right-to-Know Information
- 52.223-9 Estimate Percentage of Recovered Material Content for EPA-designated items
- 52.223-17 Alternative Procurement of EPA-designated Items in Service and Construction Contracts
- 52.223-19 Compliance with Environmental Management Systems

Applicable Products:

- Animal repellents
- Compost
- Compost mulches and mulches
- Fertilizers
- Flower-garden moss
- Hoses - Barker hose
- Hydroall mulch
- Indigenous plants

The *Contract It Green* guide gets you started with a list of typical questions to explore.

For example, if you are writing a contract for landscaping services, turn to the appropriate section of *Contract It Green* to find a list of all applicable FAR clauses and subparts. Also included is sample SOW language for you to use.



The *Contract It Green* guide also contains summaries of each FAR subpart and clause. An explanation of 52.223-1, Biobased Product Certification is found on page 14.

CONTINUED FROM PAGE 69.

These substitutes were similar to the original product but possessed environmentally sustainable qualities without varying greatly in price or availability, and with no difference in performance.

All of this information was consolidated into a master list. The master list was divided into the following six categories:

1. Painting
2. Housing
3. Galley
4. Tools
5. Office Supplies
6. Cleaning Supplies

Approximately 50 of the most popular sustainable products in each category were chosen for inclusion in the guide. NAVSUP WSS added a few well-

chosen products to even out the category lists. For each product in the guide, there is a brief description, price (at the time of printing), and the National Stock Number (NSN).

Additionally, the *Buy It Green* guide provides step-by-step instructions on how to order products within the DoD supply system via the following web sites:

1. GSA Global
2. GSA Advantage
3. DoD EMALL

This guide also includes an overview of GSA's new interactive Sustainable Facilities Tool and a listing of sustainability training opportunities.

The *Contract It Green* Guide

To assure that the DoD is working toward the 95 percent sustainability goal, compliance is checked in biannual reviews of Navy and Marine Corps contracts. The SSPP contains a metric that requires measuring the percentage

of Navy contracts that contain sustainable FAR clauses and SOW language. The metric defines sustainability as "products or services that are energy-efficient, water-efficient, biobased, environmentally preferable, non-ozone depleting, or contain recycled content or non-toxic/less toxic alternatives." (The SSPP makes an exception for the acquisition of weapon systems, their components and spare parts.)

To help implement these requirements, NAVSUP WSS

produced the *Contract It Green* guide. This guide includes information on integrating the SSPP's requirements to incorporate sustainability into Navy contracts. the *Contract It Green* guide lists all the FAR parts, subparts and clauses that pertain to integrating green decision-making into the acquisition lifecycle.

The *Contract It Green* guide also includes a list of types of contracts with green opportunities. There is sample SOW language pertaining to many different types of contracts.

In addition to this, *Contract It Green* contains links to specific green programs, and an overview of GSA's new interactive Sustainable Facilities Tool.

A searchable pdf of the *Buy It Green* guide and *Contract It Green* guide can be found on the Department of the Navy Consolidated Card Program Management Division's web site at www.navsupsup.navy.mil/ccpmd/purchase_card/buy_green.

To obtain hardcopies of either the *Buy It Green* or *Contract It Green* guides, contact Lorraine Wass at ljwass@surfbest.net.

For more information on NAVSUP's pollution prevention programs, contact John Bendick at the information provided below. ⚓

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NAVSUP's web site.



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Currents, the Navy's award-winning energy and environmental magazine, is filled with valuable insights into innovative management approaches, the latest information about new energy initiatives, and much, much more. As a *Currents* subscriber, you'd already know about the following stories:

1.

Ongoing efforts by personnel from Commander, U.S. Pacific Fleet in the Hawaii Range Complex demonstrate the Navy's commitment to research on underwater detection and tracking of marine mammals; marine mammal behavioral responses to sound; establishing hearing thresholds; determining species location and abundance; and mitigating the effects of underwater sound.

2.

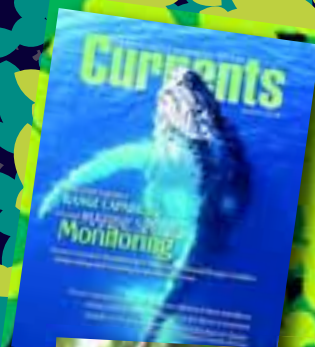
Members of the Department of Defense Partners in Amphibian and Reptile Conservation program are working hard to balance the Department's national security mission with the preservation of various amphibian and reptile species and their habitats on nearly 29 million acres of military land.

3.

The Chief of Naval Operations Environmental Awards competition honored various Navy ships, installations, individuals, and teams for environmental excellence.

Our subscribers already know about these and many other stories that we cover. You can too, when you request a hardcopy, a digital version or both. To subscribe to *Currents*, go to the magazine's on-line home on the Department of the Navy's Energy, Environment and Climate Change web site at <http://greenfleet.dodlive.mil/currents-magazine> or send an e-mail to our Distribution Manager, Lorraine Wass, at ljwass@surfbest.net with your complete mailing address. You can opt out of a hardcopy and be notified once our electronic (pdf) and digital versions of the magazine are posted to our web site. Just put "Go Green" in the subject line of your email to Lorraine.

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